A/Reissue

PATENT
Our File: WILL 2501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of:
BILL DAVIS and JESSE S. WILLIAMSON §

For Reissue of U. S. Patent 5,630,363 § Group Art Unit: _____
Issued May 20, 1997
Serial No. 08/515,097

Filing Date: May 20, 1999 § Examiner: _____

Serial No.: _____

For: **COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS**

REISSUE APPLICATION TRANSMITTAL LETTER

TO: The Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

SIR:

Transmittal herewith for filing is the Reissue Application of Bill L. Davis and Jesse S. Williamson pursuant to 35 U.S.C. §§251 et seq. and 37 C.F.R. §§1.171 et seq. Enclosed are:

1. Application for Reissue of U.S. Patent 5,630,363 Under 35 U.S.C. §251 and 37 C.F.R. §1.171;
2. Reissue Declaration of Bill L. Davis and Jesse S. Williamson;
3. Submission of Cut-Up Specification and Drawings Under 37 C.F.R. §1.173;
4. Assignee's Offer to Surrender U.S. Patent 5,630,363;
5. Order for Title Report;
6. Declaration and Power of Attorney;
7. Assent of Assignee for Reissue of U.S. Patent 5,630,363;
8. Statement of Prior Art and Other Information, PTO-1449 forms (modified) and Binder of Appendices;
9. Binder of Prior Art and Other Information (Tabbed Appendix);
10. Petition to Expunge Under 37 C.F.R. §1.59(b) and M.P.E.P. 724.05;
11. Check in the amount of $3,292.00 to cover filing and petition to expunge fees;
12. Certificate of Express Mailing; and
13. Self-Addressed, stamped postcard.

FOR	NO. FILED	NO. EXTRA	RATE	FEE
Reissue Application Filing Fee, Basic Fee, Fee Code 108			$760.00	$760.00
Reissue Independent Claims Over Those in Patent, Fee Code 109	10 more	13	$78.00	$1,014.00
Reissue Claims in Excess of Twenty and Patent, Fee Code 110	(20 + 26) = 46	46	$18.00	$828.00
Multiple Dependent Claim Presented, Fee Code 104		2	$260.00	$560.00
Petition to Expunge - §1.17(i) fee per 37 CFR §1.59(b)			$130.00	$130.00

TOTAL ADDITIONAL FEE FOR THIS AMENDMENT	$3,292.00

☐ No additional fee is required.

☑ A check in amount of $3,292.00 is attached.

☑ Please charge any additional fees or credit overpayment to Deposit Account No. 06-0075.

A duplicate copy of this sheet is enclosed.

Respectfully submitted,

Robert Hardy Falk
Registration No. 27,877
FALK & FISH, L.L.P.
700 North Pearl Street, Suite 970
Dallas, Texas 75201
Telephone: (214) 954-4400
Facsimile: (214) 969-5941

ATTORNEYS FOR APPLICANT
WILLIAMSON PRINTING CORPORATION,
a Texas Corporation

PATENT
Our File: WILL 2501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of:	§	
BILL L. DAVIS and JESSE S. WILLIAMSON	§	
	§	
For Reissue of U. S. Patent 5,630,363	§	Group Art Unit: _____
Issued May 20, 1997	§	
Serial No. 08/515,097	§	
	§	
Filing Date: May 20, 1999	§	Examiner: _____
	§	
	§	
Serial No.: _____	§	
	§	
For: **COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS**	§	

APPLICATION FOR REISSUE OF U.S. PATENT 5,630,363
UNDER 35 U.S.C. §251 AND 37 C.F.R. §1.171

TO: The Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

SIR:

Pursuant to the captioned provisions of Title 35, U.S. Code and Title 37, Code of Federal Regulations, Petitioners Bill L. Davis and Jesse S. Williamson, the original first and joint inventors of the invention described and claimed and of the discovery described in U. S. Patent 5,630,363 ("the '363 patent") and their assignee, Williamson Printing Corporation, seek reissue of the '363 patent, *inter alia*, for the following reasons:

I.

ERRORS AND POTENTIAL ERRORS

Petitioners believe that, because of what might be deemed errors in the specification and claims of U.S. Patent 5,630,363, that the '363 patent might be inoperative or invalid (a) by reason of Petitioners claiming in some instances more, and in some instances less, than they had

a right to claim in the '363 patent, or (b) for the reason that the '363 claims might be interpreted as failing to particularly point out and distinctly claim the subject matter which the Petitioners regarded as their invention. Reissue Decl., ¶2. There also exist certain errors in the specification including, but not limited to, minor stenographical errors. Petitioners have declared that all of these errors sought to be corrected arose through their unfamiliarity with U. S. patent practice, and/or through inadvertence, and were all without any deceptive intention. Petitioners seek to correct these errors through amendments to their specification and claims, and endorse the amendments set forth in their cut-up specification submitted herewith.

Petitioners have further declared that their '363 patent specification teaches a combined lithographic/flexographic process having a plurality of successive printing stations for depositing a series of thin, controlled layers of ink or coatings, including, but not limited to, printing color images, on one or both sides of a substrate in a continuous in-line process. In one embodiment of the method of their invention, one of the stations prints a first color image using the flexographic process, and at least one of the successive printing stations prints a second color image over the first color image using an offset lithographic process in the continuous in-line process. Reissue Decl., ¶4. Consistent with the teachings in their specification at col. 2, lines 49-58, reissue applicants teach specifically that in offset lithography, "many sheet fed presses can perfect (print both sides of the paper) in one pass through the press." Id.

Petitioners have noticed several potential errors in the '363 patent.

A. The Possible Misinterpretation of the Term "Over"

First, Petitioners further declare that in one embodiment of their invention, after one side of the substrate is printed or coated using the flexographic process, the reverse side of the substrate may be printed subsequently by lithography. Petitioners believed as of both the filing of their application and the issuance of the '363 patent that the independent and dependent claims clearly covered such an embodiment. Petitioners believed that to one of ordinary skill in the printing art, the language of printing "over" the substrate (see col. 5, lines 29 and 43), as well as other uses in the specification of the term "over" (e.g., col. 5, line 38 and col. 6, line 3), clearly

taught one of ordinary skill in the printing art that the reverse side of the substrate may also be printed and coated in the continuous in-line lithographic/flexographic process described in the '363 patent. Petitioners did not appreciate, both as of the time of the filing of their application and at the time the '363 claims as issued were presented and allowed, that their method and apparatus having the term "over" might be interpreted (actually misinterpreted) so as not to include the alternative of the reverse side of the substrate being printed by offset lithography and coated. Such error, if it occurred, was inadvertent and without deceptive intent. Petitioners did not contemplate that absent dependent claims, such as claims 42-43 newly presented, or claims such as the new claims in the alternative tracking specifically the language of col. 2, lines 54-55 with the limitation of printing on the reverse side of the substrate, such a misunderstanding could occur. Accordingly, Petitioners now seek by way of this application for reissue to add claims 42-84 to eliminate any ambiguity in the coverage of those claims so that the claims clearly provide that the continuous in-line lithographic/flexographic process of the '363 patent can include perfection, e.g., use of the continuous in-line process on a perfector press.

Supporting Petitioners' position is the attached testimony of Raymond J. Prince, an expert in the printing art, who acts as a technical auditor/advisor to a number of U.S. printing companies, including assignee. Prince Decl., 9, §6.

Mr. Prince is senior technical consultant in the Technical Services Group at the Graphic Arts Technical foundation in Sewickley, Pennsylvania. Mr. Prince graduated in printing management from Rochester Institute of Technology receiving a Bachelors of Science degree and has received a Masters of Science degree from South Dakota State University. He is an expert in the printing arts. Mr. Prince was asked to review U. S. Patent 5,630,363 and give his opinion as to its teachings to one of ordinary skill in the printing arts, and to respond to specific questions concerning (1) the teaching of the sentence of col. 1, line 54-55 ("Many sheet fed presses can perfect (print both sides of the paper) in one pass through the press.") as that sentence impacts the scope of the invention taught to the printing artisan, and (2) the correct interpretation of the term "over" in the specification and claims.

Regarding U.S. Patent No. 5,630,363 and the use of the word "over," Mr. Prince offered the following thoughts: The word "over" when used in the Graphic Arts Industry has many meanings. In the '363 patent it is used in two ways, namely (First) one ink printing over (on top of) another ink, coating, colorant or substrate, and (Second), ink, colorant, or coating being printed on both sides of the sheet or substrate. Prince Decl., ¶3. Specifically, as of August 14, 1995 – and the same is true today – the term "over" means to one of ordinary skill in the printing art reading the '363 patent either "on top of" (i.e., the same side of) the substrate, or paper, or by the reference in the paragraph at col. 2, lines 49-58 to the term "perfect" with respect to offset lithography, printing on the reverse side. The claims which refer to printing in a subsequent station "over" an image previously printed means unequivocally either "on top of" or "the reverse side of." Id. To amplify the points Mr. Prince offered the following:

(1) In the first meaning we commonly use the word over when describing overprinting or what a printer would call trapping of an ink. The term refers to the transfer of a coating, ink, or other colorant to the surface of another coating, ink, colorant or substrate. The coating, ink, or colorant may be wet or dry. This term has been in common usage since at least 1920 in this regard and very possibly earlier.

(2) In the second meaning the word over describes the printing of a coating, ink, or colorant on both sides of the paper or substrate during one pass on a printing press This can be accomplished in many ways: (a) the use of a blanket to blanket web press, (b) the use of a double ending hardback web press, (c) the use of a perfecting unit placed anywhere on a sheetfed press, (d) the use of a back printer on a sheetfed press located on any unit of a sheetfed press. The term in this case has been in use since 1880 in this regard and possibly earlier.

To expert Prince, the terms "perfect" or "perfecting" in the art teaches one skilled in the art several options of printing on both sides of a substrate. One option is to "tumble" the substrate in order to print on the reverse side. Prince Decl., ¶4.

As Mr. Prince reads the '363 patent, it covers all of the various ways a printer would apply a coating, ink, or colorant to another coating, ink, colorant, or substrate to form an "image Prince Decl., ¶5.

B. The Error in Claims 29 and 34

Petitioners further noticed the errors in independent method claim 29, containing the term "on top of" in the last step (col. 11, line 54) and in related dependent claim 34, containing the broader term "over" (col,. 12, line 6). Hence the dependent claim is broader than the claim it depends on. Such errors render claim 29 partially inoperable, and claim 34 potentially invalid. Such errors were inadvertent, and occurred without deceptive intent, for which reissue applications seek correction. Reissue Decl., ¶6.

C. The Possible Misinterpretation of "Image"

Petitioners are concerned that certain of their claims, e.g., claim 1, may be misunderstood as limiting the interpretation of the term "image" to ink, and worse yet, a color ink. Consistent with the specification, e.g., col. 1, lines 18-25; col. 4, lines 12-13; col. 6, lines 46-47, newly presented claims 44-84 require that surfaces at each station be deposited with thin layers of ink or coating materials so that any ambiguity is avoided. Reissue Decl., ¶7.

D. Stenographic Errors

Stenographic errors occurred in the original patent in the spelling of "Pantone" under "Other Publications" listed as prior art, and of the spelling of "flexographic" at col. 1, line 20. Both errors occurred inadvertently and without deceptive intent. Reissue Decl., ¶8.

Petitioners are informed that under 37 C.F.R. § 1.56(a) that a duty of candor and good faith toward the United States Patent and Trademark Office ("Office") rests on the inventors, on each attorney or agent who prepares or prosecutes the application and on every other individual who is substantively involved in the preparation of prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application. Reissue petitioners are now further aware that all such individuals have a duty to disclose to the Office information that each is aware of which is

material to the examination of the application and that such information is material where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent. Reissue petitioners further understand that the duty is commensurate with a degree of involvement in the preparation or prosecution of the application. Reissue petitioners are now informed that the duty of disclosure may extend to their own activities prior to the filing date of the application leading to the '363 patent. Reissue Decl., ¶3.

II.

PETITIONERS HAVE SUBMITTED A PETITION TO EXPUNGE

Since the issuance of their '363 patent, Petitioners have been contacted by a domestic manufacturer who has informed them they believe that an inventorship problem exists concerning the '363 patent. A declaration of Petitioners and exhibits thereto is submitted in a sealed envelope and sought to be expunged pursuant to the provisions of 37 C.F.R. §1.57(b) and M.P.E.P. §§724.05 and 724.02.

III.

COMPLIANCE WITH 35 U.S.C. §251 AND REGULATIONS

In this Reissue Application, Petitioners Bill L. Davis and Jesse S. Williamson and their assignee Williamson Printing Corporation have made every effort to comply with the pertinent regulations of Title 37, Code of Federal Regulations. Assignee has submitted an Order for a Title Report pursuant to 37 C.F.R. §1.171, and an Assent of Assignee for Reissue of U.S. Patent 5,630,363, pursuant to 37 C.F.R. §1.172. As indicated above, Petitioners Davis and Williamson have submitted a Reissue Declaration pursuant to 37 C.F.R. §§ 1.172 and 1.175. A cut-up specification in compliance with 37 C.F.R. §1.173, including drawings, is submitted. Assignee further submits its Offer to Surrender U.S. Patent 5,630,363, pursuant to 35 U. S. Patent 5,630,363, pursuant to 35 U.S.C. §252 and 37 C.F.R. §1.178.

Early allowance and passage to issue of the instant application is earnestly requested.

Respectfully submitted,

Robert Hardy Falk
Registration No. 27,877
FALK & FISH, L.L.P.
A Texas Limited Liability Partnership
700 North Pearl Street, Suite 970, LB 366
Dallas, Texas 75201
Telephone: (214) 954-4400
Facsimile: (214) 969-5941

COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates in general to printing machines and processes and in particular to a combined lithographic/flexographic in-line printing apparatus and process.

2. Description of Related Art

As used herein, the following terms have the meanings indicated:

ANILOX ROLLER

A steel or ceramic ink metering roller. Its surface is engraved with tiny, uniform cells that carry and deposit a thin, controlled layer of ink film or coating material onto the plate. In [flexo] flexographic presswork, anilox rollers transfer a controlled ink film from the rubber plate (or rubber-covered roller) to the web to print the image. Anilox rollers are also used in remoistenable glue units and to create "scratch-and-sniff" perfume ads.

ANILOX SYSTEM

The inking method commonly employed on flexographic presses. An elastomer-covered fountain roller supplies a controlled ink film from the ink pan to the engraved metering roller. After ink floods the metering roller, the fountain roller is squeezed or wiped usually with a doctor blade to remove the excess ink. The ink that remains on the metering roller is then transferred to the rubber printing plate.

COATER

A device with a pan to contain the coating material, a pan roller partially immersed in the coating material contained in the pan, and a coater roller to meter off a uniform film of the coating material and apply it to the printing plate.

COATING

An unbroken, clear film applied to a substrate in layers to protect and seal it, or to make it glossy.

FLEXOGRAPHIC INK

A quick-drying, fluid ink that is highly volatile or an ink that can be water based and nonvolatile.

FLEXOGRAPHY

A method of rotary letterpress printing characterized by the use of flexible, rubber, or plastic plates with raised image areas and fluid, rapid-drying inks.

HALFTONES

Dot-pattern images that have the appearance of continuous-tone images because of the limited resolving power of the human eye. This limitation accounts for an optical illusion; small halftone dots, when viewed at the normal reading distance, cannot be resolved as individual dots but blend into a continuous tone.

LITHOGRAPHIC PLATES

A lithographic plate is precoated with a light-sensitive or otherwise imageable coating, and the separation between the image and nonimage areas is maintained chemically. The image areas must be ink receptive and refuse water and the nonimage areas must be water receptive and refuse ink. The wider the difference maintained between the ink receptivity of the image areas and the water receptivity of the nonimage areas, the better the plate will be, the easier it will run on the press, and, consequently, the better the printing. There are several types of lithographic plates. The plate is an image carrier that is said to be planographic, or flat and smooth.

LITHOGRAPHY

A printing process in which the image carrier or plate is chemically treated so that the image areas are receptive to ink.

OFFSET PRINTING

An indirect printing method in which the inked image on a press plate is first transferred to a rubber blanket, that in turn "offsets" the inked impression to a press sheet. In offset lithography, the printing plate has been photochemically treated to produce image areas receptive to ink.

SLURRY

A water suspension of fibers or the suspension of pigment and adhesive used to coat papers. It may also include a suspended metallic material such as uniform-sized metal particles or nonuniform-sized metal particles.

ULTRAVIOLET INKS

Printing inks containing an activator that causes the polymerization of binders and solvents after exposure to a source of ultraviolet radiation.

Offset lithography is a process that is well known in the art and utilizes the planographic method. This means that the image and nonprinting areas are essentially on the same plane of a thin metal plate and the distinction between them is maintained chemically. There are two basic differences between offset lithography and other processes. First, it is based on the principle that grease and water do not mix. Second, the ink is offset from the first plate to a rubber blanket and then from the blanket to a substrate on which printing is to occur such as paper.

When the printing plate is made, the printing image is made grease receptive and water repellant and the nonprinting areas are made water receptive and ink repellant. The plate is mounted on the plate cylinder of the press which, as it rotates, comes in contact successively with rollers wet by a water or dampening solution and rollers wet by ink. The dampening solution wets the nonprinting areas of the plate and prevents the ink from wetting these areas. The ink wets the image areas which are transferred to the intermediate blanket cylinder. The inked image is transferred to the substrate as it passes between the blanket cylinder and the impression cylinder. Transferring the image from the plate to a rubber blanket before transfer to the substrate is called the offset principle.

One major advantage of the offset principle is that the soft rubber surface of the blanket creates a clearer impression on a wide variety of paper surfaces and other substrate materials with both rough and smooth textures with a minimum of press preparation.

Offset lithography has equipment for short, medium and long runs. Both sheetfed and web presses are used. Sheetfed lithography is used for printing advertising, books, catalogs, greeting cards, posters, labels, packaging, folding boxes, decalcomanias, coupons, trading stamps, and art reproductions. Many sheetfed presses can perfect (print both sides of the paper) in one pass through the press. Web offset is used for printing business forms, newspapers, preprinted newspaper inserts, advertising literature, catalogs, long-run books, encyclopedias, and magazines.

In offset lithography, the rubber blanket surface conforms to irregular printing surfaces, resulting in the need for less pressure and preparation. It has improved print quality of text and halftones on rough surfaced papers. Further, the substrate does not contact the printing plate thereby increasing plate life and reducing abrasive wear. Also, the image on the plate is right for reading rather than reverse reading. Finally, less ink is required for equal coverage, drying is speeded, and smudging and setoff are reduced. Setoff is a

condition that results when wet ink on the surface of the press sheets transfers or sticks to the backs of other sheets in the delivery pile.

Thus, in summary, conventional lithographic offset printing machines or presses comprise one or more image printing stations each having a printing roller or a plate cylinder to which is fastened a thin hydrophilic, oleophobic printing plate having image areas which are oleophilic and hydrophobic and background areas which are oleophobic and hydrophilic. The plate surface is continuously wetted with an aqueous damping solution which adheres only to the background areas and inked with oleo-resinous inks which adhere only to the image areas of the plate as wet ink. The ink is offset transferred to the rubber surface of a contacting blanket cylinder and then retransferred to the receptive surface of a copy web or a succession of copy sheets, such as paper, with an impression cylinder and the ink air dries by oxidation and curing after passing through a drying station.

It is also known to provide the printing machine with a downstream coating station having a blanket roller associated with a coating application unit for the application of an overall protective coating over the entire printed area of the copy sheets or web.

It is known to apply pattern coatings of protective composition by means of blanket rolls by cutting into the rubber surface of the blanket to create raised or relief surface areas which selectively receive the coating composition from the application roll for retransfer to selected areas of the copy sheets in form of pattern coatings. See U.S. Pat. No. 4.796, 556.

Lithographic inks are formulated to print from planographic surfaces which use the principle that grease and water do not mix. Lithographic inks are generally very strong in color value to compensate for the lesser amount applied. They are among the strongest of all inks. The average amount of ink transferred to the paper is about half that of letter press because of the double split of the ink film between the plate cylinder and the blanket cylinder and the blanket cylinder and the substrate on the impression cylinder.

Problems occur in the offset lithographic process when attempting to print certain colors such as white and in particular white on other colors such as yellow because the color white will be faint and not sufficiently strong. In such cases, the sheet or paper or substrate requiring the white ink usually has to be run through the same printer several times before the white becomes sufficiently strong.

Further, such colors are not generally printable in an offset lithographic printing process. This means that the sheets or substrate must be removed and transferred to a second type of machine using the flexographic process to apply greater amounts of ink in successive printing runs to achieve the desired print quality.

A like situation occurs with the printing of slurry-type materials such as "scratch-and-sniff" materials which is a liquid vehicle with a slurry containing an encapsulated essence. Such liquid vehicles, because of the nature of the slurry, must be printed with a flexographic process because the anilox roller can supply greater amounts of ink to the flexo plate on the plate cylinder.

Again, when a liquid vehicle with a slurry having suspended material therein such as metallic particles is to be printed, an offset lithographic process cannot be used without the mixing of the aqueous solution with metallic inks which cause a dulling of the image. Further, the above-mentioned double split of the ink film adds to the dulling of the image. Therefore, to achieve desired results, the printing must take place with a flexographic printing machine.

Thus, liquid opaque coatings or inks such as white colored ink, scratch-and-sniff vehicles, and slurries with metal particles do not achieve desired results when printed in an offset lithographic process and must be transferred from the offset lithographic in-line machines to a separate machine for printing in a separate run.

Such requirements not only hinder the speed of the printing process but also require additional time and thus increase the cost of the printing.

It would be advantageous to have a continuous in-line process in which not only offset lithographic printing could take place but in which, in the same in-line process, liquid printing vehicles including opaque coatings, such as white ink, and slurries containing encapsulated essences or metallic particles could also be printed and dried not only before the printing of the offset lithographic inks but also in which, after the liquid opaque coatings have been applied, an overcoating could be applied to the printed liquid vehicle image using the lithographic process in the continuous in-line process.

SUMMARY OF THE INVENTION

The present invention provides for a continuous in-line printing process having a plurality of successive printing stations for printing color images on a substrate. At least one of the stations prints a liquid vehicle image on a substrate with an opaque coating using the flexographic process and at least one of the successive printing stations printing a second color image over the liquid vehicle image on the printed substrate using the lithographic process in the continuous in-line process.

In the novel inventive system, a single in-line continuous printing process is used. One of the stations may print a liquid vehicle image on a substrate that contains a slurry with an encapsulated essence therein utilizing the flexographic process. Another one of the stations may apply an overcoating over the liquid vehicle image on the printed substrate using a lithographic process. Still another of the stations may print an aqueous-based vehicle image including a suspended metallic material therein using the flexographic process to form a metallic coating and thereafter at least one of the successive printing stations prints a color image over the aqueous-based vehicle image using the lithographic offset process in the continuous in-line process.

Whenever a station is used for flexographic printing, a flexographic plate image is placed on the blanket cylinder for receiving the liquid vehicle and transferring the liquid vehicle to the impression cylinder for printing. An anilox roller is associated with the flexographic plate for supplying the liquid vehicle which may be an aqueous-based vehicle.

In addition, in such case, a high-velocity air dryer is associated with the impression cylinder of one or more of the printing stations where the printing on the substrate is occurring to assist in drying the ink or liquid vehicle printed on the substrate while it is on or near the impression cylinder, before the substrate arrives at the next successive station for additional printing, or before printing occurs at the next successive station.

Thus, if a liquid vehicle such as white ink is to be printed, it is printed with a flexographic process which deposits a greater amount of ink on the substrate, the ink is dried with a high-velocity air dryer while the substrate is on or near the impression cylinder and prior to the substrate being received by the next successive station. If desired, at the next successive station the printing of the white liquid vehicle may again take place thus ensuring the desired intensity of

whiteness on the substrate. Subsequently, at the next succeeding station a printing may take place on top of the white printing and such printing may continue at the remaining successive stations.

Thus, it is an object of the present invention to provide a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process and in which some of the stations print using the flexographic process and other of the stations print utilizing the offset lithographic process.

It is also an object of the present invention to print an aqueous-based vehicle image including a suspended metallic material therein using the flexographic process at one printing station and at least one successive printing station printing a color image over the aqueous-based vehicle image using a lithographic process in a continuous in-line process or placing an overcoating over the aqueous-based vehicle image using the flexographic process and then printing at successive stations using the lithographic process.

It is yet another object of the present invention to provide a continuous in-line printing process in which one of the stations prints a liquid vehicle image on the substrate with a slurry containing an encapsulated essence using the flexographic process and at least one of the successive printing stations applies an overcoating over the liquid vehicle image on the printed substrate using the offset lithographic process in a continuous in-line process.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the present invention will be more fully disclosed when taken in conjunction with the following DETAILED DESCRIPTION OF THE PRESENT INVENTION in which like numerals represent like elements and in which:

FIG. 1 is a schematic view of a prior art offset lithography printing station;

FIG. 2 is a generalized depiction of a printing station that may be used either as an offset lithographic station or a flexographic printing station and illustrates how the station may be converted from an offset lithographic station to a flexographic station; and

FIG. 3 illustrates the continuous in-line process of the present invention comprising a plurality of printing stations, each of which can be converted from an offset lithographic printing station to a flexographic printing station as well as a final coating station.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

FIG. 1 is a schematic representation of a well-known offset lithography printing station **10** having a plate cylinder **12**, a blanket cylinder **14**, and an impression cylinder **16**. The printing medium or substrate, such as paper **20** either in sheet form or web, is fed over the impression cylinder **16** in printing contact with the blanket cylinder **14** to receive the image and then passes over the paper transfer cylinder **18** with the image printed thereon. An inking system **26**, well known in the art, transfers the ink from the ink supply to the plate cylinder **12**. This is a typical offset lithography printing station.

As disclosed in U.S. Pat. No. 4,796,556, offset lithographic printing machines generally have a plurality of in-line liquid application stations at least one of which is an ink image printing station for printing lithographic ink images on to suitable receptive copy sheets. The final

downstream liquid application station is a coating application station for printing a protective and/or aesthetic coating over selected portions of or over the entire ink-image printed surface of the copy sheets and can also be used to print metallic coatings or slurry. As stated in U.S. Pat. No. 4,796,556, two liquid application stations are shown, the latter including a coating apparatus and the first station being a conventional offset image printing station. The coating application printing station is one that can be modified to convert it either permanently or intermittently to a coating station from an offset lithographic station.

Such a station is illustrated in FIG. 2 herein. The station 30 comprises a housing 32 which includes therein a plate cylinder 34 that is fed with an ink system of rollers 36 that take ink from an ink supply 38 and transfer it to the plate cylinder 34. A blanket cylinder 40 is in ink transfer relationship with the plate cylinder 34 and the impression cylinder 42 where the image is transferred to a substrate passing between blanket cylinder 40 and impression cylinder 42 as blanket cylinder 40 rotates in the direction of arrow 52. This is a conventional offset lithographic printing station. When it is desired to convert that station into a coater station, the coater apparatus 43 has a coater head 44 including a supply of liquid coating and an anilox roller 46 that can be moved such that it can be in contact with either the blanket cylinder 40 for direct printing or the plate cylinder 34 for offset printing. In this case, the ink rollers 36 for the lithographic system are removed from engagement with the plate cylinder 34 in a well-known manner. The coater unit 43 includes a motor device 45, an arm 47, and a pivotal connection 48 that connects the coater head 44 with the remainder of the assembly.

As stated previously, the offset lithographic machine of FIG. 2 is converted as shown therein to a coater that is used only in the last stage of an in-line printing process. It has not been able to be used in stages other than the last printing station because the ink that is placed on the blanket cylinder by means of an anilox roller is still wet when it arrives at the subsequent stations, thus causing smearing of the printed material and causing a general impossibility of printing other information thereon. However, applicant has modified the station shown in FIG. 2 by the addition of a high-velocity air dryer 50 that is associated with the impression cylinder 42 directly after the ink is transferred from the blanket cylinder to the substrate on the impression cylinder. Thus by using flexographic inks, or aqueous coatings which are naturally quick-drying inks, and the high-velocity air dryer 50 located at the point where the ink is applied to the substrate on the impression cylinder, the ink is sufficiently dried when it passes to the next station that further printing can take place on the printed substrate.

Thus, as shown in FIG. 3, a conventional in-line offset lithographic printing machine 52 is shown having an apparatus to feed paper into the said machine, referred to as a feeder 54, printing stations 56, 58, 60, 62, and 64 and a coating station 66. A delivery station 68 receives the printed material or substrates. Thus there are a plurality of successive printing stations 56, 58, 60, 62, and 64 for printing color images on the substrate in a continuous in-line process. Any one of the printing stations 56–64 can be modified as generally shown therein and as illustrated in FIG. 2 to print a first color image using the flexographic process. The succeeding printing stations can then print a second color image over the first color image using the lithographic process in the continuous in-line process. As illustrated in FIG. 2, the flexographic process printing station includes the blanket cylinder 40 and the impression cylinder 42. A

flexographic plate **41** on the blanket cylinder **40** has an image thereon for receiving the first color from the anilox roller **46** and transferring that first color image to the impression cylinder **42** for printing on the substrate. The high-velocity air dryer **50** thus dries the flexographic ink on the substrate and passes the substrate to the subsequent printing station. Thus in FIG. **3**, station **56** may be modified as generally shown therein and as illustrated in FIG. **2** and a flexographic ink can be printed thereon at station **56**, dried by the high-velocity air dryer **50**, and coupled to subsequent in-line stations **58–64** for further printing a second or more color images over the first color image using the offset lithographic process in a continuous in-line process. The flexographic printing station shown in FIG. **2** may print a liquid vehicle image on the substrate with a slurry containing an encapsulated essence. At at least one of the successive printing stations **58–64** an overcoating may be applied over the liquid vehicle image on the printed substrate using the flexographic process in the continuous in-line process. The overcoating may be an aqueous overcoating, or an ultraviolet overcoating. In addition, the substrate may be a sheet or a web **20** as illustrated in FIG. **1** or it may be single sheet fed in the continuous in-line process from the stack sheets shown at **54** in FIG. **3**.

Further, the modified flexographic printing station **30** shown in FIG. **2**, as stated previously, may be any one of the stations **56–64** in FIG. **3**, and as illustrated by stations **56** and **58**, and may print an aqueous-based vehicle image including a suspended metallic material therein using the flexographic process to form a metallic coating. Again, after it is dried by the high-velocity air dryer **50**, it may be passed to one of the successive printing stations for printing a color image over the aqueous-based vehicle image using the offset lithographic process in the continuous in-line process. The suspended material may include uniform-sized metal particles to form the metallic coating or it may include nonuniform or multiple-sized metal particles to form the metallic coating.

The present invention is especially useful when a liquid opaque coating must be printed such as a white color ink. In that case, it may be desirable to have both stations **56** and **58** modified as shown in FIG. **3** and as illustrated in detail in FIG. **2**. In such case, the anilox roller **46** at each station delivers the white ink in the same pattern to the flexographic plate **41** on the blanket cylinder **40** for transfer to the substrate on the impression cylinder **42**. As the substrate passes the high-velocity drying station **50**, the ink is dried and the second station may again print the same white pattern on the substrate to increase the quality of the white ink appearance after it is applied to the substrate.

Thus, the station or stations that are converted to flexographic printing stations may have an ink-providing means **46** at the printing station for applying a flexographic ink to the blanket cylinder to form the image. A substrate receives the flexographic ink image transfer from the blanket cylinder and at least one subsequent printing station in the in-line process receives the image-printed substrate and prints an additional coated ink image on the substrate on top of the flexographic ink image using offset lithography. The additional colored ink images that can be printed on top of the flexographic ink images can be conventional lithographic inks or waterless inks.

Further, the colored ink images may be printed with halftone screening processes. The flexographic ink image and the colored ink images may also be printed in solids and/or halftone printing plates in sequence and in registry in successive printing stations to produce a multicolored image on the substrate. Further, the printing apparatus may include a sheetfed press or a web press.

In the present invention, at least one of the flexographic printing stations prints an image with liquid vehicle slurry containing an encapsulated essence. In another embodiment, at least one of the printing stations prints an image with a water-based liquid vehicle containing suspended particles that are either uniform or nonuniform in size. The suspended particles may be metallic particles up to substantially 16 microns in diameter.

The present invention may also use the metallic color printing process as disclosed in commonly assigned U.S. Pat. No. 5,370,976 incorporated herein by reference in its entirety.

In one aspect, the novelty of the present invention is to create a flexographic printing station that can be used at one of a plurality of printing stations in a continuous in-line process and in which, at a subsequent printing station, a lithographic process may be used to print over the liquid vehicle printed by the flexographic station.

Thus, there has been disclosed an apparatus for a combined lithographic/flexographic printing process that includes a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process and wherein one of the stations prints a first color image using the flexographic process and at least one of the successive printing stations prints a second color image over the first color image using the lithographic process in the continuous in-line process.

While the invention has been described in connection with a preferred embodiment, it is not intended to limit the scope of the invention to the particular form set forth, but, on the contrary, it is intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

We claim:

1. Apparatus for a combined lithographic/flexographic printing process comprising:

a substrate;

a plurality of successive printing stations for printing color images on the substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a liquid vehicle image on said substrate with a slurry containing an encapsulated essence using the flexographic process;

at least one of said successive printing stations being a lithographic printing station; and

an overcoating applied over the liquid vehicle image on the printed substrate at at least one of said successive lithographic printing stations using the lithographic process in said continuous in-line process.

2. Apparatus as in claim 1 wherein said overcoating is an aqueous overcoating.

3. Apparatus as in claim 1 wherein said overcoating is an ultraviolet ink overcoating.

4. Apparatus as in claim 1 wherein:

said substrate is a paper sheet; and

said apparatus includes a sheet feeder.

5. Apparatus as in claim 1 wherein:

said substrate is a web; and

said apparatus includes a web feeder.

6. Apparatus for a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station printing an aqueous-based vehicle image using the flexographic process to form a metallic coating;

a suspended metallic material being included in said aqueous-based vehicle image; and

at least one of the successive printing stations comprising an offset lithographic printing station printing a color image over the aqueous-based vehicle image using the offset lithographic process in said continuous in-line process.

7. Apparatus as in claim **6** wherein said suspended material includes uniform-sized metal particles to form said metallic coating.

8. Apparatus as in claim **6** wherein said suspended material includes nonuniform-sized metal particles to form said metallic coating.

9. Apparatus as in claim **6** further including: said flexographic printing station including a plate cylinder having a flexographic plate thereon, a blanket cylinder, and an impression cylinder;

a flexographic plate image transferred from said plate cylinder to said blanket cylinder, said image being formed of said metallic coating, said blanket cylinder transferring said metallic coating to said impression cylinder for printing said flexographic plate image on said substrate; and

an anilox roller associated with said flexographic plate for supplying said aqueous-based vehicle containing said suspended metallic material to said flexographic plate.

10. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a first color image using the flexographic process; and

at least one of the successive printing stations comprising an offset lithographic printing station for printing a second color image over the first color image using the offset lithographic process in said continuous in-line process.

11. Apparatus as in claim **10** further including:

said flexographic printing station including a plate cylinder, a blanket cylinder, and an impression cylinder;

a flexographic plate on said plate cylinder;

an anilox roller associated with said flexographic plate for supplying a first color to said flexographic plate to form said first color image; and

said blanket cylinder receiving said first color image from said plate cylinder and transferring said first color image to said impression cylinder for printing on said substrate.

12. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a substrate;

a plurality of successive printing stations for printing color images on the substrate in a continuous in-line process;

at least two successive ones of said printing stations being flexography stations and comprising:

(1) a supply of liquid coating;

(2) a plate cylinder associated with a blanket cylinder, said plate cylinder having a flexographic plate thereon;

(3) an anilox roller associated with said liquid supply coating and said plate cylinder for delivering said liquid coating to said flexographic plate to form an image for transfer to said blanket cylinder;

(4) an impression cylinder for receiving said liquid coating image transferred from said blanket cylinder and printing said image on said substrate, said at least two flexography stations printing the same liquid coating image in sequence and in superimposed relationship; and

at least one offset lithographic printing station for receiving said substrate and printing over said liquid coating image.

13. Apparatus as in claim **12** wherein said liquid coating image printed on said substrate is a white color ink.

14. Apparatus as in claim **12** further including an air dryer associated with each of said impression cylinders on said flexography stations, said air dryer having sufficient air velocity for drying said liquid coating before the substrate is transferred to the successive printing station in said continuous in-line process.

15. Apparatus for a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process, said printing stations including both lithographic and flexographic printing stations;

a blanket cylinder at at least a first one of said flexographic printing stations;

flexographic ink-providing means at said at least first one of said flexographic printing stations for applying a flexographic ink to said blanket cylinder to form an image;

a substrate for receiving said flexographic ink image transferred from said blanket cylinder; and

at least one subsequent lithographic printing station in said in-line process for receiving said image printed substrate and printing an additional colored ink image on said substrate on top of said flexographic ink image using offset lithography.

16. Apparatus as in claim **15** further comprising:

a plate cylinder at said at least first one of said flexographic stations;

a flexographic plate on said plate cylinder for receiving and transferring said flexographic ink to said blanket cylinder; and

said flexographic ink-providing means including a flexographic ink supply and an anilox roller associated with said flexographic ink supply for transferring said flexographic ink to said flexographic plate.

17. Apparatus for a combined lithographic/flexographic printing process for printing a multicolored image comprising:

a plurality of successive printing stations for printing color on a substrate in a continuous in-line process, said printing stations including both lithographic and flexographic printing stations;

at least one of said flexographic printing stations having:

(1) a plate cylinder and a blanket cylinder, said plate cylinder including a flexographic plate having an image thereon for transferring a flexographic color ink image to said blanket cylinder;

(2) an etched anilox roller for applying a flexographic color ink to said flexographic plate on said plate cylinder;

(3) an impression cylinder in ink-transfer relationship with said blanket cylinder for transferring said flexographic color ink image from said blanket cylinder to said substrate; and

at least one of said succeeding printing stations being a lithographic printing station using offset lithography for printing additional colored ink images on top of said flexographic ink image.

18. Apparatus as in claim **17** wherein said additional colored ink images are formed with lithographic inks.

19. Apparatus as in claim **17** wherein said colored ink images are formed with waterless inks.

20. Apparatus as in claim **17** further including an air dryer adjacent to said impression cylinder for drying the flexographic ink image transferred to said substrate before said additional colored ink images are printed thereon.

21. Apparatus as in claim **17** further including halftone printing plates for printing said colored ink images.

22. Apparatus as in claim **17** wherein said flexographic ink image and said colored ink images are printed as solid colors and/or with halftone printing plates in sequence and in registry in said successive printing stations to produce said multicolored image on said substrate.

23. Apparatus as in claim **17** wherein said printing apparatus includes a sheet-fed press.

24. Apparatus as in claim **17** wherein at least one of said flexographic printing stations prints said flexographic ink image with liquid vehicle slurry containing an encapsulated essence.

25. Apparatus as in claim **17** wherein at least one of said printing stations prints said flexographic ink image with a water-based liquid vehicle containing suspended particles.

26. Apparatus as in claim **25** wherein said suspended particles are uniform in size.

27. Apparatus as in claim **25** wherein said suspended particles are nonuniform in size.

28. Apparatus as in claim **25** wherein said suspended particles are metallic particles.

29. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a plurality of successive lithographic/flexographic printing stations for printing colored ink images on a substrate;

printing a flexographic ink image on said substrate at at least one of said flexographic stations;

transferring said printed substrate to at least one subsequent printing station in said continuous in-line process; and

printing colored ink images on top of said flexographic ink image at at least one of said subsequent lithographic printing stations with an offset lithographic process.

30. A method as in claim **29** further comprising the step of drying said flexographic ink image on said substrate with an air dryer prior to printing said colored ink images thereon.

31. A method as in claim **29** further including the step of printing a coating on top of said colored ink images at one of said plurality of subsequent printing stations.

32. A method as in claim **29** wherein said colored inks forming said colored ink images are waterless.

33. A method as in claim **29** wherein said colored inks forming said colored ink images are in a solvent-based liquid vehicle.

34. A method as in claim 29 further including the steps of:

printing a slurry on said substrate at any of said printing stations in said continuous in-line process;

using an encapsulated essence in said slurry; and

printing an overcoating over said slurry at a subsequent printing station in said in-line process to protect said essence.

35. A method as in claim 34 further including the step of printing an aqueous-based coating over said slurry.

36. A method as in claim 34 further including the step of printing an ultraviolet coating over said slurry.

37. A method of combining offset lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a substrate;

applying a flexographic ink to a blanket cylinder in a pattern with a coating head at a first flexographic printing station;

transferring said pattern of flexographic ink from said blanket cylinder to the substrate; and

printing a waterless ink pattern over said flexographic ink pattern on said substrate at at least one subsequent offset lithographic printing station in said continuous in-line process.

38. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

printing an aqueous-based vehicle image having suspended particles therein on a substrate at a first flexographic printing station;

transferring said image printed substrate to at least one additional printing station in said continuous in-line process; and

printing additional colored ink images on said printed substrate over said aqueous-based vehicle image in an offset lithographic process at said at least one additional printing station in said in-line process.

39. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

(1) providing a plurality of successive printing stations for printing liquid vehicle images on a substrate in said in-line continuous process;

(2) utilizing an anilox roller to transfer a liquid ink as said liquid vehicle to a flexographic plate image at at least one of said printing stations;

(3) printing said liquid ink from said flexographic plate image to a substrate;

(4) transferring said printed substrate with said liquid ink image to a subsequent printing station in said in-line printing process;

(5) repeating steps (2)–(4) at subsequent printing stations in said in-line process to achieve a desired opacity ink image on said substrate; and

(6) printing an ink pattern over said flexographic ink image using an offset lithographic process.

40. A method as in claim 39 further including the step of additionally printing colored ink images over said liquid ink image on said substrate at subsequent ones of said printing stations in said in-line process.

41. A method as in claim 40 wherein said liquid ink is an opaque white color.

* * * * *

PATENT
Our File: WILL 2501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of:
BILL L. DAVIS and JESSE S. WILLIAMSON

For Reissue of U. S. Patent 5,630,363
Issued May 20, 1997
Serial No. 08/515,097

Group Art Unit: _____

Filing Date: May 20, 1999

Examiner: _____

Serial No.: _____

For: **COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS**

[51] **Int. Cl.**[6] **B41M 1/18**; B41M 7/00; B41M 1/04; B41F 23/00

[52] **U.S. Cl.** **101/141**; 101/181; 101/183; 101/424.1; 101/424.2; 101/479; 101/483; 101/491; 101/DIG. 49

[58] **Field of Search** ..... 101/135–138, 101/141–143, 450.1, 174, 180, 181, 183, 416.1, 424.1, 424.2, 479, 491, DIG. 29, DIG. 49, 483

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,499,870	3/1950	Luehrs	101/138
2,988,989	6/1961	Crawford	101/152
3,072,050	1/1963	Wolff	101/DIG. 49
4,011,812	3/1977	Locha	101/176
4,056,056	11/1977	Giori	101/152
4,180,407	12/1979	Gibson et al.	106/26
4,186,661	2/1980	Vieau	101/178
4,373,442	2/1983	Dahlgren et al.	101/207
4,373,443	2/1983	Matalia et al.	101/221
4,417,516	11/1983	Fischer	101/181
4,421,027	12/1983	Fischer	101/142
4,437,402	3/1984	Fischer	101/181
4,610,201	9/1986	Jeschke	101/DIG. 49
4,729,909	3/1988	Noack	427/288
4,758,886	7/1988	Rylander	358/80
4,796,556	1/1989	Bird	118/46
4,989,079	1/1991	Ito	358/80
4,989,080	1/1991	Ito	358/80
5,144,419	9/1992	Nakatsuka et al.	358/75
5,178,678	1/1993	Koehler et al.	118/46
5,184,556	2/1993	Schaenble	101/483
5,370,976	12/1994	Williamson et al.	430/358

OTHER PUBLICATIONS

"[Pontone®] Pantone® Metallic Integrated Process Color Selector, Pantone Metallic–Buntdruck–Farbskala", The Pantone Library of Color, 201 Pantone, Inc. 1990, pp. MIPP VI–VIII.

Primary Examiner—Stephen R. Funk
Attorney, Agent, or Firm—Jones, Day, Reavis & Pogue

[57] **ABSTRACT**

A combined lithographic/flexographic printing process having a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process. One of the stations prints a first color image using the flexographic process and at least one of the successive printing stations prints a second color image over the first color image using an offset lithographic process in the continuous in-line process.

41 Claims, 1 Drawing Sheet

EXHIBIT
A

COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates in general to printing machines and processes and in particular to a combined lithographic/flexographic in-line printing apparatus and process.

2. Description of Related Art

As used herein, the following terms have the meanings indicated:

ANILOX ROLLER

A steel or ceramic ink metering roller. Its surface is engraved with tiny, uniform cells that carry and deposit a thin, controlled layer of ink film or coating material onto the plate. In [flexo] flexographic presswork, anilox rollers transfer a controlled ink film from the rubber plate (or rubber-covered roller) to the web to print the image. Anilox rollers are also used in remoistenable glue units and to create "scratch-and-sniff" perfume ads.

ANILOX SYSTEM

The inking method commonly employed on flexographic presses. An elastomer-covered fountain roller supplies a controlled ink film from the ink pan to the engraved metering roller. After ink floods the metering roller, the fountain roller is squeezed or wiped usually with a doctor blade to remove the excess ink. The ink that remains on the metering roller is then transferred to the rubber printing plate.

COATER

A device with a pan to contain the coating material, a pan roller partially immersed in the coating material contained in the pan, and a coater roller to meter off a uniform film of the coating material and apply it to the printing plate.

COATING

An unbroken, clear film applied to a substrate in layers to protect and seal it, or to make it glossy.

FLEXOGRAPHIC INK

A quick-drying, fluid ink that is highly volatile or an ink that can be water based and nonvolatile.

FLEXOGRAPHY

A method of rotary letterpress printing characterized by the use of flexible, rubber, or plastic plates with raised image areas and fluid, rapid-drying inks.

HALFTONES

Dot-pattern images that have the appearance of continuous-tone images because of the limited resolving power of the human eye. This limitation accounts for an optical illusion; small halftone dots, when viewed at the normal reading distance, cannot be resolved as individual dots but blend into a continuous tone.

LITHOGRAPHIC PLATES

A lithographic plate is precoated with a light-sensitive or otherwise imageable coating, and the separation between the image and nonimage areas is maintained chemically. The image areas must be ink receptive and refuse water and the nonimage areas must be water receptive and refuse ink. The wider the difference maintained between the ink receptivity of the image areas and the water receptivity of the nonimage areas, the better the plate will be, the easier it will run on the press, and, consequently, the better the printing. There are several types of lithographic plates. The plate is an image carrier that is said to be planographic, or flat and smooth.

LITHOGRAPHY

A printing process in which the image carrier or plate is chemically treated so that the image areas are receptive to ink.

OFFSET PRINTING

An indirect printing method in which the inked image on a press plate is first transferred to a rubber blanket, that in turn "offsets" the inked impression to a press sheet. In offset lithography, the printing plate has been photochemically treated to produce image areas receptive to ink.

SLURRY

A water suspension of fibers or the suspension of pigment and adhesive used to coat papers. It may also include a suspended metallic material such as uniform-sized metal particles or nonuniform-sized metal particles.

ULTRAVIOLET INKS

Printing inks containing an activator that causes the polymerization of binders and solvents after exposure to a source of ultraviolet radiation.

Offset lithography is a process that is well known in the art and utilizes the planographic method. This means that the image and nonprinting areas are essentially on the same plane of a thin metal plate and the distinction between them is maintained chemically. There are two basic differences between offset lithography and other processes. First, it is based on the principle that grease and water do not mix. Second, the ink is offset from the first plate to a rubber blanket and then from the blanket to a substrate on which printing is to occur such as paper.

When the printing plate is made, the printing image is made grease receptive and water repellant and the nonprinting areas are made water receptive and ink repellant. The plate is mounted on the plate cylinder of the press which, as it rotates, comes in contact successively with rollers wet by a water or dampening solution and rollers wet by ink. The dampening solution wets the nonprinting areas of the plate and prevents the ink from wetting these areas. The ink wets the image areas which are transferred to the intermediate blanket cylinder. The inked image is transferred to the substrate as it passes between the blanket cylinder and the impression cylinder. Transferring the image from the plate to a rubber blanket before transfer to the substrate is called the offset principle.

One major advantage of the offset principle is that the soft rubber surface of the blanket creates a clearer impression on a wide variety of paper surfaces and other substrate materials with both rough and smooth textures with a minimum of press preparation.

Offset lithography has equipment for short, medium and long runs. Both sheetfed and web presses are used. Sheetfed lithography is used for printing advertising, books, catalogs, greeting cards, posters, labels, packaging, folding boxes, decalcomanias, coupons, trading stamps, and art reproductions. Many sheetfed presses can perfect (print both sides of the paper) in one pass through the press. Web offset is used for printing business forms, newspapers, preprinted newspaper inserts, advertising literature, catalogs, long-run books, encyclopedias, and magazines.

In offset lithography, the rubber blanket surface conforms to irregular printing surfaces, resulting in the need for less pressure and preparation. It has improved print quality of text and halftones on rough surfaced papers. Further, the substrate does not contact the printing plate thereby increasing plate life and reducing abrasive wear. Also, the image on the plate is right for reading rather than reverse reading. Finally, less ink is required for equal coverage, drying is speeded, and smudging and setoff are reduced. Setoff is a

condition that results when wet ink on the surface of the press sheets transfers or sticks to the backs of other sheets in the delivery pile.

Thus, in summary, conventional lithographic offset printing machines or presses comprise one or more image printing stations each having a printing roller or a plate cylinder to which is fastened a thin hydrophilic, oleophobic printing plate having image areas which are oleophilic and hydrophobic and background areas which are oleophobic and hydrophilic. The plate surface is continuously wetted with an aqueous damping solution which adheres only to the background areas and inked with oleo-resinous inks which adhere only to the image areas of the plate as wet ink. The ink is offset transferred to the rubber surface of a contacting blanket cylinder and then retransferred to the receptive surface of a copy web or a succession of copy sheets, such as paper, with an impression cylinder and the ink air dries by oxidation and curing after passing through a drying station.

It is also known to provide the printing machine with a downstream coating station having a blanket roller associated with a coating application unit for the application of an overall protective coating over the entire printed area of the copy sheets or web.

It is known to apply pattern coatings of protective composition by means of blanket rolls by cutting into the rubber surface of the blanket to create raised or relief surface areas which selectively receive the coating composition from the application roll for retransfer to selected areas of the copy sheets in form of pattern coatings. See U.S. Pat. No. 4.796, 556.

Lithographic inks are formulated to print from planographic surfaces which use the principle that grease and water do not mix. Lithographic inks are generally very strong in color value to compensate for the lesser amount applied. They are among the strongest of all inks. The average amount of ink transferred to the paper is about half that of letter press because of the double split of the ink film between the plate cylinder and the blanket cylinder and the blanket cylinder and the substrate on the impression cylinder.

Problems occur in the offset lithographic process when attempting to print certain colors such as white and in particular white on other colors such as yellow because the color white will be faint and not sufficiently strong. In such cases, the sheet or paper or substrate requiring the white ink usually has to be run through the same printer several times before the white becomes sufficiently strong.

Further, such colors are not generally printable in an offset lithographic printing process. This means that the sheets or substrate must be removed and transferred to a second type of machine using the flexographic process to apply greater amounts of ink in successive printing runs to achieve the desired print quality.

A like situation occurs with the printing of slurry-type materials such as "scratch-and-sniff" materials which is a liquid vehicle with a slurry containing an encapsulated essence. Such liquid vehicles, because of the nature of the slurry, must be printed with a flexographic process because the anilox roller can supply greater amounts of ink to the flexo plate on the plate cylinder.

Again, when a liquid vehicle with a slurry having suspended material therein such as metallic particles is to be printed, an offset lithographic process cannot be used without the mixing of the aqueous solution with metallic inks which cause a dulling of the image. Further, the above-mentioned double split of the ink film adds to the dulling of the image. Therefore, to achieve desired results, the printing must take place with a flexographic printing machine.

Thus, liquid opaque coatings or inks such as white colored ink, scratch-and-sniff vehicles, and slurries with metal particles do not achieve desired results when printed in an offset lithographic process and must be transferred from the offset lithographic in-line machines to a separate machine for printing in a separate run.

Such requirements not only hinder the speed of the printing process but also require additional time and thus increase the cost of the printing.

It would be advantageous to have a continuous in-line process in which not only offset lithographic printing could take place but in which, in the same in-line process, liquid printing vehicles including opaque coatings, such as white ink, and slurries containing encapsulated essences or metallic particles could also be printed and dried not only before the printing of the offset lithographic inks but also in which, after the liquid opaque coatings have been applied, an overcoating could be applied to the printed liquid vehicle image using the lithographic process in the continuous in-line process.

SUMMARY OF THE INVENTION

The present invention provides for a continuous in-line printing process having a plurality of successive printing stations for printing color images on a substrate. At least one of the stations prints a liquid vehicle image on a substrate with an opaque coating using the flexographic process and at least one of the successive printing stations printing a second color image over the liquid vehicle image on the printed substrate using the lithographic process in the continuous in-line process.

In the novel inventive system, a single in-line continuous printing process is used. One of the stations may print a liquid vehicle image on a substrate that contains a slurry with an encapsulated essence therein utilizing the flexographic process. Another one of the stations may apply an overcoating over the liquid vehicle image on the printed substrate using a lithographic process. Still another of the stations may print an aqueous-based vehicle image including a suspended metallic material therein using the flexographic process to form a metallic coating and thereafter at least one of the successive printing stations prints a color image over the aqueous-based vehicle image using the lithographic offset process in the continuous in-line process.

Whenever a station is used for flexographic printing, a flexographic plate image is placed on the blanket cylinder for receiving the liquid vehicle and transferring the liquid vehicle to the impression cylinder for printing. An anilox roller is associated with the flexographic plate for supplying the liquid vehicle which may be an aqueous-based vehicle.

In addition, in such case, a high-velocity air dryer is associated with the impression cylinder of one or more of the printing stations where the printing on the substrate is occurring to assist in drying the ink or liquid vehicle printed on the substrate while it is on or near the impression cylinder, before the substrate arrives at the next successive station for additional printing, or before printing occurs at the next successive station.

Thus, if a liquid vehicle such as white ink is to be printed, it is printed with a flexographic process which deposits a greater amount of ink on the substrate, the ink is dried with a high-velocity air dryer while the substrate is on or near the impression cylinder and prior to the substrate being received by the next successive station. If desired, at the next successive station the printing of the white liquid vehicle may again take place thus ensuring the desired intensity of

whiteness on the substrate. Subsequently, at the next succeeding station a printing may take place on top of the white printing and such printing may continue at the remaining successive stations.

Thus, it is an object of the present invention to provide a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process and in which some of the stations print using the flexographic process and other of the stations print utilizing the offset lithographic process.

It is also an object of the present invention to print an aqueous-based vehicle image including a suspended metallic material therein using the flexographic process at one printing station and at least one successive printing station printing a color image over the aqueous-based vehicle image using a lithographic process in a continuous in-line process or placing an overcoating over the aqueous-based vehicle image using the flexographic process and then printing at successive stations using the lithographic process.

It is yet another object of the present invention to provide a continuous in-line printing process in which one of the stations prints a liquid vehicle image on the substrate with a slurry containing an encapsulated essence using the flexographic process and at least one of the successive printing stations applies an overcoating over the liquid vehicle image on the printed substrate using the offset lithographic process in a continuous in-line process.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the present invention will be more fully disclosed when taken in conjunction with the following DETAILED DESCRIPTION OF THE PRESENT INVENTION in which like numerals represent like elements and in which:

FIG. 1 is a schematic view of a prior art offset lithography printing station;

FIG. 2 is a generalized depiction of a printing station that may be used either as an offset lithographic station or a flexographic printing station and illustrates how the station may be converted from an offset lithographic station to a flexographic station; and

FIG. 3 illustrates the continuous in-line process of the present invention comprising a plurality of printing stations, each of which can be converted from an offset lithographic printing station to a flexographic printing station as well as a final coating station.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

FIG. 1 is a schematic representation of a well-known offset lithography printing station **10** having a plate cylinder **12**, a blanket cylinder **14**, and an impression cylinder **16**. The printing medium or substrate, such as paper **20** either in sheet form or web, is fed over the impression cylinder **16** in printing contact with the blanket cylinder **14** to receive the image and then passes over the paper transfer cylinder **18** with the image printed thereon. An inking system **26**, well known in the art, transfers the ink from the ink supply to the plate cylinder **12**. This is a typical offset lithography printing station.

As disclosed in U.S. Pat. No. 4,796,556, offset lithographic printing machines generally have a plurality of in-line liquid application stations at least one of which is an ink image printing station for printing lithographic ink images on to suitable receptive copy sheets. The final

downstream liquid application station is a coating application station for printing a protective and/or aesthetic coating over selected portions of or over the entire ink-image printed surface of the copy sheets and can also be used to print metallic coatings or slurry. As stated in U.S. Pat. No. 4,796,556, two liquid application stations are shown, the latter including a coating apparatus and the first station being a conventional offset image printing station. The coating application printing station is one that can be modified to convert it either permanently or intermittently to a coating station from an offset lithographic station.

Such a station is illustrated in FIG. 2 herein. The station **30** comprises a housing **32** which includes therein a plate cylinder **34** that is fed with an ink system of rollers **36** that take ink from an ink supply **38** and transfer it to the plate cylinder **34**. A blanket cylinder **40** is in ink transfer relationship with the plate cylinder **34** and the impression cylinder **42** where the image is transferred to a substrate passing between blanket cylinder **40** and impression cylinder **42** as blanket cylinder **40** rotates in the direction of arrow **52**. This is a conventional offset lithographic printing station. When it is desired to convert that station into a coater station, the coater apparatus **43** has a coater head **44** including a supply of liquid coating and an anilox roller **46** that can be moved such that it can be in contact with either the blanket cylinder **40** for direct printing or the plate cylinder **34** for offset printing. In this case, the ink rollers **36** for the lithographic system are removed from engagement with the plate cylinder **34** in a well-known manner. The coater unit **43** includes a motor device **45**, an arm **47**, and a pivotal connection **48** that connects the coater head **44** with the remainder of the assembly.

As stated previously, the offset lithographic machine of FIG. **2** is converted as shown therein to a coater that is used only in the last stage of an in-line printing process. It has not been able to be used in stages other than the last printing station because the ink that is placed on the blanket cylinder by means of an anilox roller is still wet when it arrives at the subsequent stations, thus causing smearing of the printed material and causing a general impossibility of printing other information thereon. However, applicant has modified the station shown in FIG. **2** by the addition of a high-velocity air dryer **50** that is associated with the impression cylinder **42** directly after the ink is transferred from the blanket cylinder to the substrate on the impression cylinder. Thus by using flexographic inks, or aqueous coatings which are naturally quick-drying inks, and the high-velocity air dryer **50** located at the point where the ink is applied to the substrate on the impression cylinder, the ink is sufficiently dried when it passes to the next station that further printing can take place on the printed substrate.

Thus, as shown in FIG. **3**, a conventional in-line offset lithographic printing machine **52** is shown having an apparatus to feed paper into the said machine, referred to as a feeder **54**, printing stations **56**, **58**, **60**, **62**, and **64** and a coating station **66**. A delivery station **68** receives the printed material or substrates. Thus there are a plurality of successive printing stations **56**, **58**, **60**, **62**, and **64** for printing color images on the substrate in a continuous in-line process. Any one of the printing stations **56–64** can be modified as generally shown therein and as illustrated in FIG. **2** to print a first color image using the flexographic process. The succeeding printing stations can then print a second color image over the first color image using the lithographic process in the continuous in-line process. As illustrated in FIG. **2**, the flexographic process printing station includes the blanket cylinder **40** and the impression cylinder **42**. A

flexographic plate **41** on the blanket cylinder **40** has an image thereon for receiving the first color from the anilox roller **46** and transferring that first color image to the impression cylinder **42** for printing on the substrate. The high-velocity air dryer **50** thus dries the flexographic ink on the substrate and passes the substrate to the subsequent printing station. Thus in FIG. **3**, station **56** may be modified as generally shown therein and as illustrated in FIG. **2** and a flexographic ink can be printed thereon at station **56**, dried by the high-velocity air dryer **50**, and coupled to subsequent in-line stations **58–64** for further printing a second or more color images over the first color image using the offset lithographic process in a continuous in-line process. The flexographic printing station shown in FIG. **2** may print a liquid vehicle image on the substrate with a slurry containing an encapsulated essence. At at least one of the successive printing stations **58–64** an overcoating may be applied over the liquid vehicle image on the printed substrate using the flexographic process in the continuous in-line process. The overcoating may be an aqueous overcoating, or an ultraviolet overcoating. In addition, the substrate may be a sheet or a web **20** as illustrated in FIG. **1** or it may be single sheet fed in the continuous in-line process from the stack sheets shown at **54** in FIG. **3**.

Further, the modified flexographic printing station **30** shown in FIG. **2**, as stated previously, may be any one of the stations **56–64** in FIG. **3**, and as illustrated by stations **56** and **58**, and may print an aqueous-based vehicle image including a suspended metallic material therein using the flexographic process to form a metallic coating. Again, after it is dried by the high-velocity air dryer **50**, it may be passed to one of the successive printing stations for printing a color image over the aqueous-based vehicle image using the offset lithographic process in the continuous in-line process. The suspended material may include uniform-sized metal particles to form the metallic coating or it may include nonuniform or multiple-sized metal particles to form the metallic coating.

The present invention is especially useful when a liquid opaque coating must be printed such as a white color ink. In that case, it may be desirable to have both stations **56** and **58** modified as shown in FIG. **3** and as illustrated in detail in FIG. **2**. In such case, the anilox roller **46** at each station delivers the white ink in the same pattern to the flexographic plate **41** on the blanket cylinder **40** for transfer to the substrate on the impression cylinder **42**. As the substrate passes the high-velocity drying station **50**, the ink is dried and the second station may again print the same white pattern on the substrate to increase the quality of the white ink appearance after it is applied to the substrate.

Thus, the station or stations that are converted to flexographic printing stations may have an ink-providing means **46** at the printing station for applying a flexographic ink to the blanket cylinder to form the image. A substrate receives the flexographic ink image transfer from the blanket cylinder and at least one subsequent printing station in the in-line process receives the image-printed substrate and prints an additional coated ink image on the substrate on top of the flexographic ink image using offset lithography. The additional colored ink images that can be printed on top of the flexographic ink images can be conventional lithographic inks or waterless inks.

Further, the colored ink images may be printed with halftone screening processes. The flexographic ink image and the colored ink images may also be printed in solids and/or halftone printing plates in sequence and in registry in successive printing stations to produce a multicolored image on the substrate. Further, the printing apparatus may include a sheetfed press or a web press.

In the present invention, at least one of the flexographic printing stations prints an image with liquid vehicle slurry containing an encapsulated essence. In another embodiment, at least one of the printing stations prints an image with a water-based liquid vehicle containing suspended particles that are either uniform or nonuniform in size. The suspended particles may be metallic particles up to substantially 16 microns in diameter.

The present invention may also use the metallic color printing process as disclosed in commonly assigned U.S. Pat. No. 5,370,976 incorporated herein by reference in its entirety.

In one aspect, the novelty of the present invention is to create a flexographic printing station that can be used at one of a plurality of printing stations in a continuous in-line process and in which, at a subsequent printing station, a lithographic process may be used to print over the liquid vehicle printed by the flexographic station.

Thus, there has been disclosed an apparatus for a combined lithographic/flexographic printing process that includes a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process and wherein one of the stations prints a first color image using the flexographic process and at least one of the successive printing stations prints a second color image over the first color image using the lithographic process in the continuous in-line process.

While the invention has been described in connection with a preferred embodiment, it is not intended to limit the scope of the invention to the particular form set forth, but, on the contrary, it is intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

We claim:

1. Apparatus for a combined lithographic/flexographic printing process comprising:

a substrate;

a plurality of successive printing stations for printing color images on the substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a liquid vehicle image on said substrate with a slurry containing an encapsulated essence using the flexographic process;

at least one of said successive printing stations being a lithographic printing station; and

an overcoating applied over the liquid vehicle image on the printed substrate at at least one of said successive lithographic printing stations using the lithographic process in said continuous in-line process.

2. Apparatus as in claim 1 wherein said overcoating is an aqueous overcoating.

3. Apparatus as in claim 1 wherein said overcoating is an ultraviolet ink overcoating.

4. Apparatus as in claim 1 wherein:

said substrate is a paper sheet; and

said apparatus includes a sheet feeder.

5. Apparatus as in claim 1 wherein:

said substrate is a web; and

said apparatus includes a web feeder.

6. Apparatus for a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station printing an aqueous-based vehicle image using the flexographic process to form a metallic coating;

a suspended metallic material being included in said aqueous-based vehicle image; and

at least one of the successive printing stations comprising an offset lithographic printing station printing a color image over the aqueous-based vehicle image using the offset lithographic process in said continuous in-line process.

7. Apparatus as in claim **6** wherein said suspended material includes uniform-sized metal particles to form said metallic coating.

8. Apparatus as in claim **6** wherein said suspended material includes nonuniform-sized metal particles to form said metallic coating.

9. Apparatus as in claim **6** further including: said flexographic printing station including a plate cylinder having a flexographic plate thereon, a blanket cylinder, and an impression cylinder;

a flexographic plate image transferred from said plate cylinder to said blanket cylinder, said image being formed of said metallic coating, said blanket cylinder transferring said metallic coating to said impression cylinder for printing said flexographic plate image on said substrate; and

an anilox roller associated with said flexographic plate for supplying said aqueous-based vehicle containing said suspended metallic material to said flexographic plate.

10. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a first color image using the flexographic process; and

at least one of the successive printing stations comprising an offset lithographic printing station for printing a second color image over the first color image using the offset lithographic process in said continuous in-line process.

11. Apparatus as in claim **10** further including:

said flexographic printing station including a plate cylinder, a blanket cylinder, and an impression cylinder;

a flexographic plate on said plate cylinder;

an anilox roller associated with said flexographic plate for supplying a first color to said flexographic plate to form said first color image; and

said blanket cylinder receiving said first color image from said plate cylinder and transferring said first color image to said impression cylinder for printing on said substrate.

12. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a substrate;

a plurality of successive printing stations for printing color images on the substrate in a continuous in-line process;

at least two successive ones of said printing stations being flexography stations and comprising:

(1) a supply of liquid coating;

(2) a plate cylinder associated with a blanket cylinder, said plate cylinder having a flexographic plate thereon;

(3) an anilox roller associated with said liquid supply coating and said plate cylinder for delivering said liquid coating to said flexographic plate to form an image for transfer to said blanket cylinder;

(4) an impression cylinder for receiving said liquid coating image transferred from said blanket cylinder and printing said image on said substrate, said at least two flexography stations printing the same liquid coating image in sequence and in superimposed relationship; and

at least one offset lithographic printing station for receiving said substrate and printing over said liquid coating image.

13. Apparatus as in claim **12** wherein said liquid coating image printed on said substrate is a white color ink.

14. Apparatus as in claim **12** further including an air dryer associated with each of said impression cylinders on said flexography stations, said air dryer having sufficient air velocity for drying said liquid coating before the substrate is transferred to the successive printing station in said continuous in-line process.

15. Apparatus for a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process, said printing stations including both lithographic and flexographic printing stations;

a blanket cylinder at at least a first one of said flexographic printing stations;

flexographic ink-providing means at said at least first one of said flexographic printing stations for applying a flexographic ink to said blanket cylinder to form an image;

a substrate for receiving said flexographic ink image transferred from said blanket cylinder; and

at least one subsequent lithographic printing station in said in-line process for receiving said image printed substrate and printing an additional colored ink image on said substrate on top of said flexographic ink image using offset lithography.

16. Apparatus as in claim **15** further comprising:

a plate cylinder at said at least first one of said flexographic stations;

a flexographic plate on said plate cylinder for receiving and transferring said flexographic ink to said blanket cylinder; and

said flexographic ink-providing means including a flexographic ink supply and an anilox roller associated with said flexographic ink supply for transferring said flexographic ink to said flexographic plate.

17. Apparatus for a combined lithographic/flexographic printing process for printing a multicolored image comprising:

a plurality of successive printing stations for printing color on a substrate in a continuous in-line process, said printing stations including both lithographic and flexographic printing stations;

at least one of said flexographic printing stations having:

(1) a plate cylinder and a blanket cylinder, said plate cylinder including a flexographic plate having an image thereon for transferring a flexographic color ink image to said blanket cylinder;

(2) an etched anilox roller for applying a flexographic color ink to said flexographic plate on said plate cylinder;

(3) an impression cylinder in ink-transfer relationship with said blanket cylinder for transferring said flexographic color ink image from said blanket cylinder to said substrate; and

at least one of said succeeding printing stations being a lithographic printing station using offset lithography for printing additional colored ink images on top of said flexographic ink image.

18. Apparatus as in claim **17** wherein said additional colored ink images are formed with lithographic inks.

19. Apparatus as in claim **17** wherein said colored ink images are formed with waterless inks.

20. Apparatus as in claim **17** further including an air dryer adjacent to said impression cylinder for drying the flexographic ink image transferred to said substrate before said additional colored ink images are printed thereon.

21. Apparatus as in claim **17** further including halftone printing plates for printing said colored ink images.

22. Apparatus as in claim **17** wherein said flexographic ink image and said colored ink images are printed as solid colors and/or with halftone printing plates in sequence and in registry in said successive printing stations to produce said multicolored image on said substrate.

23. Apparatus as in claim **17** wherein said printing apparatus includes a sheet-fed press.

24. Apparatus as in claim **17** wherein at least one of said flexographic printing stations prints said flexographic ink image with liquid vehicle slurry containing an encapsulated essence.

25. Apparatus as in claim **17** wherein at least one of said printing stations prints said flexographic ink image with a water-based liquid vehicle containing suspended particles.

26. Apparatus as in claim **25** wherein said suspended particles are uniform in size.

27. Apparatus as in claim **25** wherein said suspended particles are nonuniform in size.

28. Apparatus as in claim **25** wherein said suspended particles are metallic particles.

29. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a plurality of successive lithographic/flexographic printing stations for printing colored ink images on a substrate;

printing a flexographic ink image on said substrate at at least one of said flexographic stations;

transferring said printed substrate to at least one subsequent printing station in said continuous in-line process; and

printing colored ink images on top of said flexographic ink image at at least one of said subsequent lithographic printing stations with an offset lithographic process.

30. A method as in claim **29** further comprising the step of drying said flexographic ink image on said substrate with an air dryer prior to printing said colored ink images thereon.

31. A method as in claim **29** further including the step of printing a coating on top of said colored ink images at one of said plurality of subsequent printing stations.

32. A method as in claim **29** wherein said colored inks forming said colored ink images are waterless.

33. A method as in claim **29** wherein said colored inks forming said colored ink images are in a solvent-based liquid vehicle.

34. A method as in claim 29 further including the steps of:

printing a slurry on said substrate at any of said printing stations in said continuous in-line process;

using an encapsulated essence in said slurry; and

printing an overcoating over said slurry at a subsequent printing station in said in-line process to protect said essence.

35. A method as in claim 34 further including the step of printing an aqueous-based coating over said slurry.

36. A method as in claim 34 further including the step of printing an ultraviolet coating over said slurry.

37. A method of combining offset lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a substrate;

applying a flexographic ink to a blanket cylinder in a pattern with a coating head at a first flexographic printing station;

transferring said pattern of flexographic ink from said blanket cylinder to the substrate; and

printing a waterless ink pattern over said flexographic ink pattern on said substrate at at least one subsequent offset lithographic printing station in said continuous in-line process.

38. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

printing an aqueous-based vehicle image having suspended particles therein on a substrate at a first flexographic printing station;

transferring said image printed substrate to at least one additional printing station in said continuous in-line process; and

printing additional colored ink images on said printed substrate over said aqueous-based vehicle image in an offset lithographic process at said at least one additional printing station in said in-line process.

39. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

(1) providing a plurality of successive printing stations for printing liquid vehicle images on a substrate in said in-line continuous process;

(2) utilizing an anilox roller to transfer a liquid ink as said liquid vehicle to a flexographic plate image at at least one of said printing stations;

(3) printing said liquid ink from said flexographic plate image to a substrate;

(4) transferring said printed substrate with said liquid ink image to a subsequent printing station in said in-line printing process;

(5) repeating steps (2)–(4) at subsequent printing stations in said in-line process to achieve a desired opacity ink image on said substrate; and

(6) printing an ink pattern over said flexographic ink image using an offset lithographic process.

40. A method as in claim 39 further including the step of additionally printing colored ink images over said liquid ink image on said substrate at subsequent ones of said printing stations in said in-line process.

41. A method as in claim 40 wherein said liquid ink is an opaque white color.

* * * * *

PATENT
Our File: WILL 2501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of:
BILL L. DAVIS and JESSE S. WILLIAMSON

For Reissue of U. S. Patent 5,630,363
Issued May 20, 1997
Serial No. 08/515,097

Filing Date: May 20, 1999

Serial No.: _____

Group Art Unit: _____

Examiner: _____

For: **COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS**

[51] **Int. Cl.**[6] **B41M 1/18**; B41M 7/00; B41M 1/04; B41F 23/00

[52] **U.S. Cl.** **101/141**; 101/181; 101/183; 101/424.1; 101/424.2; 101/479; 101/483; 101/491; 101/DIG. 49

[58] **Field of Search** ..... 101/135–138, 101/141–143, 450.1, 174, 180, 181, 183, 416.1, 424.1, 424.2, 479, 491, DIG. 29, DIG. 49, 483

[56] **References Cited**

U.S. PATENT DOCUMENTS

2,499,870	3/1950	Luehrs	101/138
2,988,989	6/1961	Crawford	101/152
3,072,050	1/1963	Wolff	101/DIG. 49
4,011,812	3/1977	Lecha	101/176
4,056,056	11/1977	Giori	101/152
4,180,407	12/1979	Gibson et al.	106/26
4,186,661	2/1980	Vieau	101/178
4,373,442	2/1983	Dahlgren et al.	101/207
4,373,443	2/1983	Matalia et al.	101/221
4,417,516	11/1983	Fischer	101/181
4,421,027	12/1983	Fischer	101/142
4,437,402	3/1984	Fischer	101/181
4,610,201	9/1986	Jeschke	101/DIG. 49
4,729,909	3/1988	Noack	427/288
4,758,886	7/1988	Rylander	358/80
4,796,556	1/1989	Bird	118/46
4,989,079	1/1991	Ito	358/80
4,989,080	1/1991	Ito	358/80
5,144,419	9/1992	Nakatsuka et al.	358/75
5,178,678	1/1993	Koehler et al.	118/46
5,184,556	2/1993	Schaeuble	101/483
5,370,976	12/1994	Williamson et al.	430/358

OTHER PUBLICATIONS

"[Pontone®] Pantone® Metallic Integrated Process Color Selector, Pantone Metallic–Buntdruck–Farbskala", **The Pantone Library of Color, 201 Pantone, Inc. 1990, pp. MIPP VI–VIII.**

Primary Examiner—Stephen R. Funk
Attorney, Agent, or Firm—Jones, Day, Reavis & Pogue

[57] **ABSTRACT**

A combined lithographic/flexographic printing process having a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process. One of the stations prints a first color image using the flexographic process and at least one of the successive printing stations prints a second color image over the first color image using an offset lithographic process in the continuous in-line process.

41 Claims, 1 Drawing Sheet

Reissue of U. S. Patent No. 5,630,363

CLAIMS

Note: Bracketed material in the following claims has been deleted from U. S. Patent 5,630,363 as issued; underlined materials, including new claims 42-84 has been added.

1. Apparatus for a combined lithographic/flexographic printing process comprising:

a substrate;

a plurality of successive printing stations for printing color images on the substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a liquid vehicle image on said substrate with a slurry containing an encapsulated essence using the flexographic process;

at least one of said successive printing stations being a lithographic printing station; and

an overcoating applied over the liquid vehicle image on the printed substrate at at least one of said successive lithographic printing stations using the lithographic process in said continuous in-line process.

2. Apparatus as in claim 1 wherein said overcoating is an aqueous overcoating.

3. Apparatus as in claim 1 wherein said overcoating is an ultraviolet ink overcoating.

4. Apparatus as in claim 1 wherein:

said substrate is a paper sheet; and

said apparatus includes a sheet feeder.

5. Apparatus as in claim 1 wherein:

said substrate is a web; and

said apparatus includes a web feeder.

6. Apparatus for a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station printing an aqueous-based vehicle image using the flexographic process to form a metallic coating;

a suspended metallic material being included in said aqueous-based vehicle image; and

at least one of the successive printing stations comprising an offset lithographic printing station printing a color image over the aqueous-based vehicle image using the offset lithographic process in said continuous in-line process.

7. Apparatus as in claim 6 wherein said suspended material includes uniform-sized metal particles to form said metallic coating.

8. Apparatus as in claim 6 wherein said suspended material includes nonuniform-sized metal particles to form said metallic coating.

9. Apparatus as in claim 6 further including: said flexographic printing station including a plate cylinder having a flexographic plate thereon, a blanket cylinder, and an impression cylinder;

a flexographic plate image transferred from said plate cylinder to said blanket cylinder, said image being formed of said metallic coating, said blanket cylinder transferring said metallic coating to said impression

cylinder for printing said flexographic plate image on said substrate; and

an anilox roller associated with said flexographic plate for supplying said aqueous-based vehicle containing said suspended metallic material to said flexographic plate.

10. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a first color image using the flexographic process; and

at least one of the successive printing stations comprising an offset lithographic printing station for printing a second color image over the first color image using the offset lithographic process in said continuous in-line process.

11. Apparatus as in claim 10 further including:

said flexographic printing station including a plate cylinder, a blanket cylinder, and an impression cylinder;

a flexographic plate on said plate cylinder;

an anilox roller associated with said flexographic plate for supplying a first color to said flexographic plate to form said first color image; and

said blanket cylinder receiving said first color image from said plate cylinder and transferring said first color image to said impression cylinder for printing on said substrate.

12. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a substrate;

a plurality of successive printing stations for printing color images on the substrate in a continuous in-line process;

at least two successive ones of said printing stations being flexography stations and comprising:

(1) a supply of liquid coating;

(2) a plate cylinder associated with a blanket cylinder, said plate cylinder having a flexographic plate thereon;

(3) an anilox roller associated with said liquid supply coating and said plate cylinder for delivering said liquid coating to said flexographic plate to form an image for transfer to said blanket cylinder;

(4) an impression cylinder for receiving said liquid coating image transferred from said blanket cylinder and printing said image on said substrate, said at least two flexography stations printing the same liquid coating image in sequence and in superimposed relationship; and

at least one offset lithographic printing station for receiving said substrate and printing over said liquid coating image.

13. Apparatus as in claim 12 wherein said liquid coating image printed on said substrate is a white color ink.

14. Apparatus as in claim 12 further including an air dryer associated with each of said impression cylinders on said flexography stations, said air dryer having sufficient air velocity for drying said liquid coating before the substrate is transferred to the successive printing station in said continuous in-line process.

15. Apparatus for a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing color images on a substrate in a continuous in-line process, said printing stations including both lithographic and flexographic printing stations;

a blanket cylinder at at least a first one of said flexographic printing stations;

flexographic ink-providing means at said at least first one of said flexographic printing stations for applying a flexographic ink to said blanket cylinder to form an image;

a substrate for receiving said flexographic ink image transferred from said blanket cylinder; and

at least one subsequent lithographic printing station in said in-line process for receiving said image printed substrate and printing an additional colored ink image on said substrate on top of said flexographic ink image using offset lithography.

16. Apparatus as in claim 15 further comprising:

a plate cylinder at said at least first one of said flexographic stations;

a flexographic plate on said plate cylinder for receiving and transferring said flexographic ink to said blanket cylinder; and

said flexographic ink-providing means including a flexographic ink supply and an anilox roller associated with said flexographic ink supply for transferring said flexographic ink to said flexographic plate.

17. Apparatus for a combined lithographic/ flexographic printing process for printing a multicolored image comprising:

a plurality of successive printing stations for printing color on a substrate in a continuous in-line process, said printing stations including both lithographic and flexographic printing stations;

at least one of said flexographic printing stations having:

(1) a plate cylinder and a blanket cylinder, said plate cylinder including a flexographic plate having an

image thereon for transferring a flexographic color ink image to said blanket cylinder;

(2) an etched anilox roller for applying a flexographic color ink to said flexographic plate on said plate cylinder;

(3) an impression cylinder in ink-transfer relationship with said blanket cylinder for transferring said flexographic color ink image from said blanket cylinder to said substrate; and

at least one of said succeeding printing stations being a lithographic printing station using offset lithography for printing additional colored ink images on top of said flexographic ink image.

18. Apparatus as in claim 17 wherein said additional colored ink images are formed with lithographic inks.

19. Apparatus as in claim 17 wherein said colored ink images are formed with waterless inks.

20. Apparatus as in claim 17 further including an air dryer adjacent to said impression cylinder for drying the flexographic ink image transferred to said substrate before said additional colored ink images are printed thereon.

21. Apparatus as in claim 17 further including halftone printing plates for printing said colored ink images.

22. Apparatus as in claim 17 wherein said flexographic ink image and said colored ink images are printed as solid colors and/or with halftone printing plates in sequence and in registry in said successive printing stations to produce said multicolored image on said substrate.

23. Apparatus as in claim 17 wherein said printing apparatus includes a sheet-fed press.

24. Apparatus as in claim 17 wherein at least one of said flexographic printing stations prints said flexographic ink image with liquid vehicle slurry containing an encapsulated essence.

25. Apparatus as in claim 17 wherein at least one of said printing stations prints said flexographic ink image with a water-based liquid vehicle containing suspended particles.

26. Apparatus as in claim 25 wherein said suspended particles are uniform in size.

27. Apparatus as in claim 25 wherein said suspended particles are nonuniform in size.

28. Apparatus as in claim 25 wherein said suspended particles are metallic particles.

29. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a plurality of successive lithographic/flexographic printing stations for printing colored ink images on a substrate;

printing a flexographic ink image on said substrate at at least one of said flexographic stations;

transferring said printed substrate to at least one subsequent printing station in said continuous in-line process; and

printing colored ink images [on top of] <u>over</u> said flexographic ink image at at least one of said subsequent lithographic printing stations with an offset lithographic process.

30. A method as in claim 29 further comprising the step of drying said flexographic ink image on said substrate with an air dryer prior to printing said colored ink images thereon.

31. A method as in claim 29 further including the step of printing a coating on top of said colored ink images at one of said plurality of subsequent printing stations.

32. A method as in claim 29 wherein said colored inks forming said colored ink images are waterless.

33. A method as in claim 29 wherein said colored inks forming said colored ink images are in a solvent-based liquid vehicle.

34. A method as in claim 29 further including the steps of:

printing a slurry on said substrate at any of said printing stations in said continuous in-line process;

using an encapsulated essence in said slurry; and

printing an overcoating [over] on top of said slurry at a subsequent printing station in said in-line process to protect said essence.

35. A method as in claim 34 further including the step of printing an aqueous-based coating over said slurry.

36. A method as in claim 34 further including the step of printing an ultraviolet coating over said slurry.

37. A method of combining offset lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a substrate;

applying a flexographic ink to a blanket cylinder in a pattern with a coating head at a first flexographic printing station;

transferring said pattern of flexographic ink from said blanket cylinder to the substrate; and

printing a waterless ink pattern over said flexographic ink pattern on said substrate at at least one subsequent offset lithographic printing station in said continuous in-line process.

38. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

printing an aqueous-based vehicle image having suspended particles therein on a substrate at a first flexographic printing station;

transferring said image printed substrate to at least one additional printing station in said continuous in-line process; and

printing additional colored ink images on said printed substrate over said aqueous-based vehicle image in an offset lithographic process at said at least one additional printing station in said in-line process.

39. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

(1) providing a plurality of successive printing stations for printing liquid vehicle images on a substrate in said in-line continuous process;

(2) utilizing an anilox roller to transfer a liquid ink as said liquid vehicle to a flexographic plate image at at least one of said printing stations;

(3) printing said liquid ink from said flexographic plate image to a substrate;

(4) transferring said printed substrate with said liquid ink image to a subsequent printing station in said in-line printing process;

(5) repeating steps (2)-(4) at subsequent printing stations in said in-line process to achieve a desired opacity ink image on said substrate; and

(6) printing an ink pattern over said flexographic ink image using an offset lithographic process.

40. A method as in claim 39 further including the step of additionally printing colored ink images over said liquid ink image on said substrate at subsequent ones of said printing stations in said in-line process.

41. A method as in claim 40 wherein said liquid ink is an opaque white color.

42. The apparatus of any of claims 1, 6, 10, 12, 15 and 17, wherein the substrate is printed on both sides in one pass during the continuous in-line process.

43. The method of any of claims 29, 37, 38 or 39 wherein the substrate is printed on both sides in one pass during the continuous in-line process.

44. Apparatus for a combined lithographic/flexographic printing process comprising:

a substrate;

a plurality of successive printing stations for depositing a series of thin, controlled layers on one side of a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a liquid vehicle image on said substrate using a flexographic process; and

at least one of said successive printing stations being a lithographic printing station;

whereby said substrate is printed on top of or on the opposite side of that previously printed at at least one of said successive lithographic printing stations using the lithographic process in said continuous in-line process.

45. Apparatus as in claim 44 wherein at least one of said thin, controlled layers at the flexographic station is a coating material.

46. Apparatus as in claim 44 wherein at least one of said thin, controlled layers at one of the lithographic stations is an ink.

47. Apparatus as in claim 44 wherein:

said substrate is a paper sheet; and

said apparatus includes a sheet feeder.

48. Apparatus as in claim 44 wherein:

said substrate is a web; and

said apparatus includes a web feeder.

49. The apparatus of claim 44 for a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for depositing a series of thin, controlled layers on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station printing an aqueous-based vehicle on one side of the substrate using the flexographic process to form a metallic coating image;

a suspended metallic material being included in said aqueous-based vehicle; and

at least one of the successive printing stations comprising an offset lithographic printing station printing a color image on top of the aqueous-based vehicle or on the opposite side to that previously printed using the offset lithographic process in said continuous in-line process.

50. Apparatus as in claim 49 wherein said suspended material includes uniform-sized metal particles to form said metallic coating.

51. Apparatus as in claim 49 wherein said suspended material includes nonuniform-sized metal particles to form said metallic coating.

52. Apparatus as in claim 49 further including: said flexographic printing station including a plate cylinder having a flexographic plate thereon, a blanket cylinder, and an impression cylinder;

a flexographic plate image transferred from said plate cylinder to said blanket cylinder, said image being formed of said metallic coating, said blanket cylinder transferring said metallic coating to said impression cylinder for printing said flexographic plate image on said substrate; and

an anilox roller associated with said flexographic plate for supplying said aqueous-based vehicle containing said suspended metallic material to said flexographic plate.

53. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a plurality of successive printing stations for depositing a series of thin, controlled layers on a substrate in a continuous in-line process;

one of said stations comprising a flexographic printing station for printing a first color image using the flexographic process; and

at least one of the other successive printing stations comprising an offset lithographic printing station for printing a second color image on the reverse side of the substrate of the first color image using the offset lithographic process in said continuous in-line process.

54. Apparatus as in claim 53 further including:

said flexographic printing station including a plate cylinder, a blanket cylinder, and an impression cylinder;

a flexographic plate on said plate cylinder;

an anilox roller associated with said flexographic plate for supplying a first color to said flexographic plate to form said first color image; and

said blanket cylinder receiving said first color image from said plate cylinder and transferring said first color image to said impression cylinder for printing on said substrate.

55. Apparatus for creating a combined lithographic/flexographic printing process comprising:

a substrate;

a plurality of successive printing stations for depositing a series of thin, controlled layers on a substrate in a continuous in-line process;

at least one of said printing stations being flexographic stations and comprising:

(1) a supply of liquid coating;

(2) a plate cylinder associated with a blanket cylinder, said plate cylinder having a flexographic plate thereon;

(3) an anilox roller associated with said liquid supply coating and said plate cylinder for delivering said liquid coating to said flexographic plate to form an image for transfer to said blanket cylinder;

(4) an impression cylinder for receiving said liquid coating image transferred from said blanket cylinder and printing said image on one side of said substrate; and

at least one offset lithographic printing station for receiving said substrate and printing on top of or on the opposite side to that previously printed.

56. Apparatus as in claim 55 wherein said liquid coating image printed on said substrate is a white color ink.

57. Apparatus as in claim 56 further including an air dryer associated with each of said impression cylinders on said flexography stations, said air dryer having sufficient air velocity for drying said liquid coating before the substrate is transferred to the successive printing station in said continuous in-line process.

58. Apparatus for a combined lithographic/ flexographic printing process comprising:

a plurality of successive printing stations for depositing a series of thin, controlled layers on a substrate in a continuous in-line process, said printing stations including both lithographic and at least two flexographic printing stations;

a blanket cylinder at at least a first one of said flexographic printing stations;

flexographic ink-providing means at the other of said flexographic printing stations for applying a flexographic ink to said blanket cylinder to form an image on one side of a substrate;

a substrate for receiving said flexographic ink image transferred from said blanket cylinder; and

at least one subsequent lithographic printing station in said in-line process for receiving said image printed substrate and printing an additional colored ink image on said substrate on top of said flexographic ink image or the opposite side to that previously printed using offset lithography.

59. Apparatus as in claim 58 further comprising:

a plate cylinder at said at least first one of said flexographic stations;

a flexographic plate on said plate cylinder for receiving and transferring said flexographic ink to said blanket cylinder; and

said flexographic ink-providing means including a flexographic ink supply and an anilox roller associated with said flexographic ink supply for transferring said flexographic ink to said flexographic plate.

60. Apparatus for a combined lithographic/ flexographic printing process for printing a multicolored image comprising:

a plurality of successive printing stations for depositing a series of thin, controlled layers on a substrate in a continuous in-line process, said printing stations including both lithographic and flexographic printing stations;

at least one of said flexographic printing stations having:

(1) a plate cylinder and a blanket cylinder, said plate cylinder including a flexographic plate having an image thereon for transferring a flexographic color ink image to said blanket cylinder;

(2) an etched anilox roller for applying a flexographic color ink to said flexographic plate on said plate cylinder;

(3) an impression cylinder in ink-transfer relationship with said blanket cylinder for transferring said flexographic color ink image from said blanket cylinder to one side of said substrate; and

at least one of said succeeding printing stations being a lithographic printing station using offset lithography for printing additional colored ink images on top of said flexographic ink image or on the opposite side to that that previously printed.

61. Apparatus as in claim 60 wherein said additional colored ink images are formed with lithographic inks.

62. Apparatus as in claim 60 wherein said colored ink images are formed with waterless inks.

63. Apparatus as in claim 60 further including an air dryer adjacent to said impression cylinder for drying the flexographic ink image transferred to said substrate before said additional colored ink images are printed thereon.

64. Apparatus as in claim 60 further including halftone printing plates for printing said colored ink images.

65. Apparatus as in claim 60 wherein said flexographic ink image and said colored ink images are printed as solid colors and/or with halftone printing plates in sequence and in registry in said successive printing stations to produce said multicolored image on said substrate.

66. Apparatus as in claim 60 wherein said printing apparatus includes a sheet-fed press.

67. Apparatus as in claim 60 wherein at least one of said flexographic printing stations prints said flexographic ink image with liquid vehicle slurry containing an encapsulated essence.

68. Apparatus as in claim 60 wherein at least one of said printing stations prints said flexographic ink image with a water-based liquid vehicle containing suspended particles.

69. Apparatus as in claim 68 wherein said suspended particles are uniform in size.

70. Apparatus as in claim 68 wherein said suspended particles are nonuniform in size.

71. Apparatus as in claim 68 wherein said suspended particles are metallic particles.

72. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a plurality of successive lithographic/ flexographic printing stations for depositing a series of thin, controlled layers on a substrate;

printing an image as one of said thin controlled layers on one side of said substrate at at least one of said flexographic stations;

transferring said printed substrate to at least one subsequent printing station in said continuous in-line process; and

printing an image on the reverse side of said substrate having said flexographic ink image, at at least one of said other subsequent lithographic printing stations with an offset lithographic process in the continuous in-line process.

73. A method as in claim 72 further comprising the step of drying said flexographic ink image on said substrate with an air dryer prior to printing said colored ink images thereon.

74. A method as in claim 72 further including the step of printing a coating on top of said colored ink images at one of said plurality of subsequent printing stations.

75. A method as in claim 72 wherein said colored inks forming said colored ink images are waterless.

76. A method as in claim 72 wherein said colored inks forming said colored ink images are in a solvent-based liquid vehicle.

77. A method as in claim 72 further including the steps of:

printing a slurry on one side of said substrate at any of said printing stations in said continuous in-line process;

using an encapsulated essence in said slurry; and

printing an ink on the reverse side of said substrate at a subsequent printing station in said in-line process.

78. A method as in claim 77urther including the step of printing an aqueous-based coating over said slurry.

79. A method as in claim 77 further including the step of printing an ultraviolet coating over said slurry.

80. A method of combining offset lithography and flexographic printing in a continuous in-line process comprising the steps of:

providing a substrate;

applying an ink or coating to a blanket cylinder in a pattern with a coating head at a flexographic printing station;

transferring said pattern of ink or coating from said blanket cylinder to one side of the substrate; and

printing a waterless ink pattern on the reverse side of said substrate at at least one subsequent offset lithographic printing station in said continuous in-line process.

81. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

printing an aqueous-based vehicle having suspended particles therein on one side of a substrate at a flexographic printing station to form an image;

transferring said image printed substrate to at least one additional printing station in said continuous in-line process; and

printing additional images on the reverse side of said printed substrate in an offset lithographic process at said at least one additional printing station in said in-line process.

82. A method of combining lithography and flexographic printing in a continuous in-line process comprising the steps of:

(1) providing a plurality of successive printing stations for depositing a series of thin, controlled layers on a substrate in said in-line continuous process;

(2) utilizing an anilox roller to transfer a liquid ink as one of said thin controlled layers to a flexographic plate image at at least one of said printing stations;

(3) printing said liquid ink from said flexographic plate image to one side of a substrate;

(4) transferring said printed substrate with said liquid ink image to a subsequent printing station in said in-line printing process;

(5) repeating steps (2)-(4) at subsequent printing stations in said in-line process to achieve a desired opacity ink image on the one side of said substrate; and

(6) printing an ink pattern on the reverse side of said substrate using an offset lithographic process.

83. A method as in claim 82 further including the step of additionally printing ink images over said liquid ink image on said substrate at subsequent ones of said printing stations in said in-line process.

84. A method as in claim 83 wherein said liquid ink is an opaque white color.

85. A method of combining offset lithography and flexography using a plurality of successive printing stations in a continuous in-line process comprising:

(1) printing an image at one or more of said printing stations on a substrate using an offset lithographic process;

(2) transferring said image printed substrate to an additional printing station and printing at said additional printing station a coating on all or part of said image on said substrate;

(3) transferring said substrate to one or more additional printing stations for printing the reverse side of the said substrate; and

(4) printing an image on said reverse side of said substrate at one of such one or more printing stations using an offset lithographic process in the continuous in-line process.

86. Apparatus for a combined offset lithographic and flexographic printing process comprising:

(1) a substrate;

(2) a plurality of successive printing stations for depositing a series of thin layers of materials selected from a group consisting of lithographic and flexographic inks, coatings and slurries on one or both sides of a substrate in a continuous in-line process;

(3) at least one of said stations comprising a flexographic printing station for printing one of said flexographic materials on said substrate using a flexographic process;

(4) at least one of said successive printing stations being an offset lithographic printing station whereby said offset lithographic printing station is used to deposit one of said lithographic materials on either side of the said substrate in the continuous in-line process;

87. Apparatus for a combined offset lithographic/flexographic printing process comprising:

a plurality of successive printing stations for printing images on a substrate in a continuous in-line process, said printing stations including both offset lithographic and flexographic printing stations for depositing lithographic and flexographic inks, coatings and slurries on said substrate, whereby said lithographic and flexographic inks, coatings or slurries may be printed successively on one or both sides of said substrate in the continuous in-line process.

PATENT
Our File: WILL 2501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of:	§	
BILL L. DAVIS and JESSE S. WILLIAMSON	§	
	§	
For Reissue of U. S. Patent 5,630,363	§	Group Art Unit: _____
Issued May 20, 1997	§	
Serial No. 08/515,097	§	
	§	
Filing Date: May 20, 1999	§	Examiner: _____
	§	
	§	
Serial No.: _____	§	
	§	
For: **COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS**	§	

PETITION TO EXPUNGE UNDER 37 C.F.R. §1.59(b) AND M.P.E.P. §724.05

TO: The Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

SIR:

Pursuant to the provisions of 37 C.F.R. §1.59(b) and M.P.E.P. §724.05 and §724.02, Patentees Bill L. Davis and Jesse S. Williamson and their Assignee of Record, Williamson Printing Corporation, petition the Commissioner to expunge the attached envelope comprising the Joint Declaration of Bill L. Davis and Jesse S. Williamson with the attached documents thereto.

Information has come to the attention of Reissue Declarants and their Assignee of Record since the issuance of the '363 patent that a manufacturer disputes the inventorship of the '363 patent. Reissue Declarants disagree with the manufacturer's contention, but wishes in an abundance of caution to bring this confidential information to the attention of the PTO. The information is believed to be non-material, and therefore should be expunged.

In the event that any part of any document, or any part of any declaration or exhibit thereto is considered material, but the remainder of said document/declaration is not considered materials, Assignee Williamson Manufacturing, Inc. and Patentees Bill L. Davis and Jesse S. Williamson request the opportunity to further redact said information and submit a redacted document consistent with the provisions of 37 C.F.R. §1.59(b) (1997) and M.P.E.P. §724.05.

Respectfully submitted,

Robert Hardy Falk
Registration No. 27,877
FALK & FISH, L.L.P.
A Texas Limited Liability Partnership
700 North Pearl Street, Suite 970, LB 366
Dallas, Texas 75201
Telephone: (214) 954-4400
Facsimile: (214) 969-5941

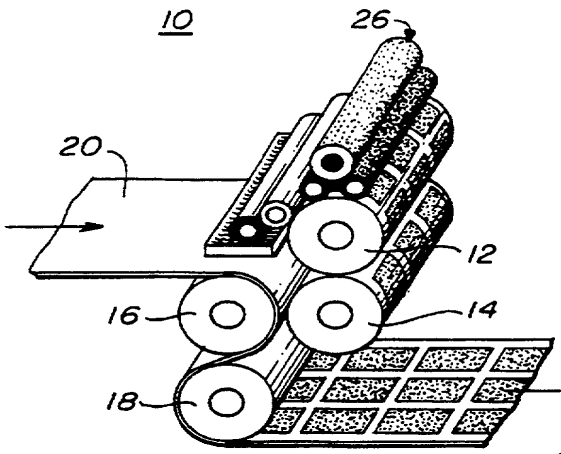

FIG. 1
PRIOR ART

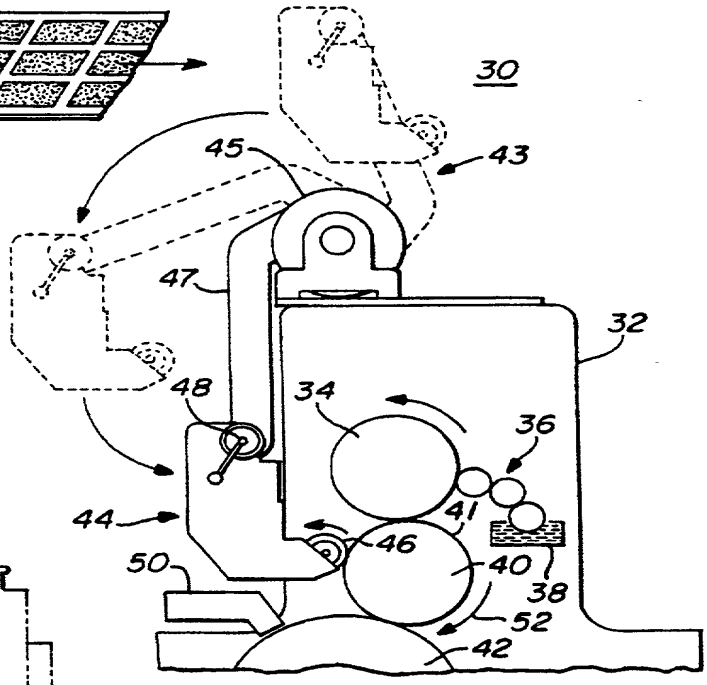

FIG. 2

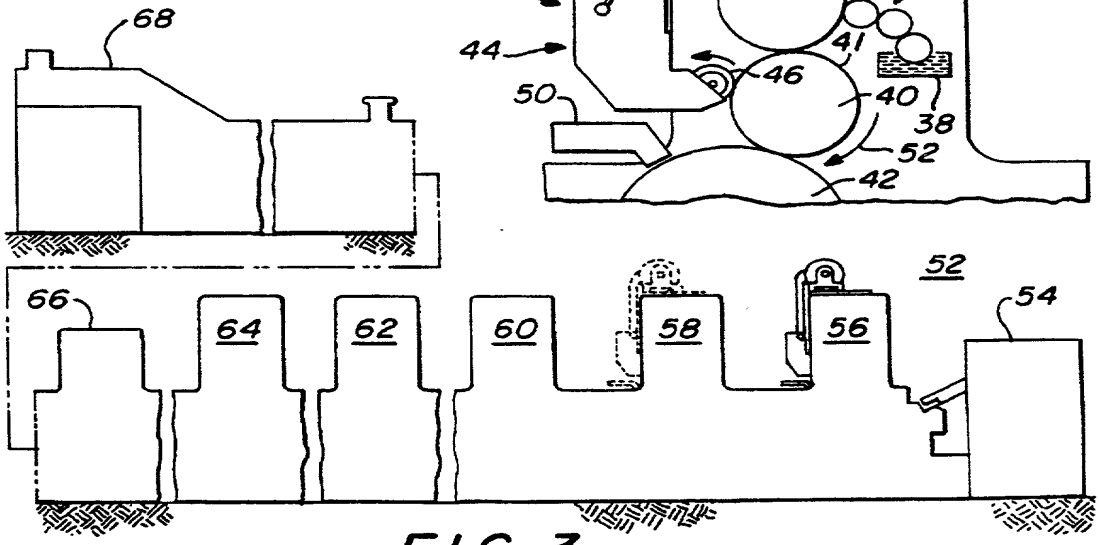

FIG. 3

PATENT
Our File: WILL 2501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of:	§	
BILL L. DAVIS and JESSE S. WILLIAMSON	§	
	§	
For Reissue of U. S. Patent 5,630,363	§	Group Art Unit: _____
Issued May 20, 1997	§	
Serial No. 08/515,097	§	
	§	
Filing Date: May 20, 1999	§	Examiner: _____
	§	
	§	
Serial No.: _____	§	
	§	
For: **COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS**	§	

REISSUE DECLARATION

TO: The Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

SIR:

Petitioners, (1) Bill L. Davis, of 1126 Tipton Road, Irving, Texas 75067; and (2) Jesse S. Williamson, of 5738 Caruth, Dallas, Texas 75209, declare that:

1. We verily believe ourselves to be the original, first and sole inventors of the invention described and claimed, and of the discovery described, in U.S. Patent 5,630,363 and in the specification thereof, and for which invention and discovery we solicit a reissue patent.

2. Petitioners verily believe that, because of what might be deemed errors in the specification and claims of U.S. Patent 5,630,363, that said '363 patent might be inoperative or invalid (a) by reason of Petitioners claiming in some instances more, and in some instances less, than they had a right to claim in the '363 patent, or (b) for the reason that the '363 claims might be interpreted as failing to particularly point out and distinctly claim the subject matter which the undersigned Petitioners regard as their invention. There also exists certain errors in the

specification including, but not limited to, minor stenographical errors. Petitioners declare that all of these errors sought to be corrected arose through their unfamiliarity with U. S. patent practice, and/or through inadvertence, and were all without any deceptive intention. Petitioners seek to correct these errors through amendments to their specification and claims, and endorse the amendments set forth in Exhibit "A" hereto.

3. Petitioners are informed that under 37 C.F.R. § 1.56(a) that a duty of candor and good faith toward the United States Patent and Trademark Office ("Office") rests on the inventors, on each attorney or agent who prepares or prosecutes the application and on every other individual who is substantively involved in the preparation of prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application. Reissue petitioners are now further aware that all such individuals have a duty to disclose to the Office information that each is aware of which is material to the examination of the application and that such information is material where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent. Reissue petitioners further understand that the duty is commensurate with a degree of involvement in the preparation or prosecution of the application. Reissue petitioners are now informed that the duty of disclosure may extend to their own activities prior to the filing date of the application leading to the '363 patent.

4. Petitioners further declare that their '363 patent specification teaches a combined lithographic/flexographic process having a plurality of successive printing stations for depositing a series of thin, controlled layers of ink or coatings, including, but not limited to, printing color images, on one or both sides of a substrate in a continuous in-line process. In one embodiment of the method of their invention, one of the stations prints a first color image using the flexographic process, and at least one of the successive printing stations prints a second color image over the first color image using an offset lithographic process in the continuous in-line process. Consistent with the teachings in their specification at col. 2, lines 49-58, reissue

applicants teach specifically that in offset lithography, "many sheet fed presses can perfect (print both sides of the paper) in one pass through the press."

5. Petitioners have noticed several potential errors are found in the '363 patent. First, Petitioners further declare that in one embodiment of their invention, the reverse side of the substrate may be printed subsequently by lithography and subsequently coated. Petitioners believed as of both the filing of their application and the issuance of the '363 patent that the independent and dependent claims clearly covered such an embodiment. Petitioners believed that to one of ordinary skill in the printing art, the language of printing "over" the substrate (see col. 5, lines 29 and 43), as well as other uses in the specification of the term "over" (e.g., col. 5, line 38 and col. 6, line 3), clearly taught one of ordinary skill in the printing art that the reverse side of the substrate may also be printed and coated in the continuous in-line lithographic/flexographic process described in the '363 patent. Petitioners did not appreciate, both as of the time of the filing of this application and at the time the '363 claims as issued were presented and allowed, that their method and apparatus having the term "over" might be interpreted (actually misinterpreted) so as not to include the alternative of the reverse side of the substrate being printed by offset lithography and coated. Such error, if it occurred, was inadvertent and without deceptive intent. Petitioners did not contemplate that absent dependent claims, such as claims 42-43 newly presented, or claims such as the new claims in the alternative tracking specifically the language of col. 2, lines 54-55 with the limitation of printing on the reverse side of the substrate, such a misunderstanding could occur. Accordingly, Petitioners now seek by way of this application for reissue to add claims 42-84 to eliminate any ambiguity in the coverage of those claims so that the claims clearly provide that the continuous in-line lithographic/flexographic process of the '363 patent can include perfection, e.g., on a perfector press.

6. Second, Petitioners further notice the errors in independent method claim 29, containing the term "on top of" in the last step (col. 11, line 54) and in related dependent claim 34, containing the broader term "over" (col,. 12, line 6). Hence the dependent claim is broader

than the claim it depends on. Such errors render claim 29 partially inoperable, and claim 34 potentially invalid. Such errors were inadvertent, and occurred without deceptive intent, for which reissue applications seek correction.

7. Third, Petitioners are concerned that certain of their claims, e.g., claim 1, may be misunderstood as limiting the interpretation of the term "image" to ink, and worse yet, a color ink. Consistent with the specification, e.g., col. 1, lines 18-25; col. 4, lines 12-13; col. 6, lines 46-47, newly presented claims 44-84 require that surfaces at each station be deposited with layers of ink or coating materials so that any ambiguity is avoided.

8. Stenographic errors occurred in the original patent in the spelling of "Pantone" under "Other Publications" listed as prior art, and of the spelling of "flexographic" at col. 1, line 20. Both errors occurred inadvertently and without deceptive intent.

9. With respect to each of claims 1-41, as amended, and new claims 42-84, we declare that we believe we are the original first and joint inventors of the subject matter therein claimed and for which a reissue patent is sought on the invention set forth in the attached specification entitled COMBINED LITHOGRAPHIC/FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS, a copy of which amended specification is attached hereto as Exhibit "A"; we hereto state that we have reviewed and understand the contents of this amended specification, including the amended and new claims. As indicated above, we acknowledge our duty to disclose any and all information which is material to examination of this reissue patent application in accordance with 37 C.F.R. §1.56(a). We further declare that we do not know and do not believe that said invention was ever known or ever used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof, or patented or described in any printed publication more than one year before the filing date of the first application leading to the '363 patent; or in public use or on sale in the United States of America more than one year prior to the date of the first application leading to the '363 patent; further, that said invention has not been patented or made the subject to any inventor's certificate issued before the filing date of the first application

leading to the '363 patent in any country foreign to the United States of America on any application filed by me or our legal representative or assigns more than twelve (12) months prior to the filing date of said first patent application in the United States of America, and has not been abandoned.

The undersigned Petitioners declare further that all statements made herein of Petitioners' own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application of any reissue patent issuing thereon.

Bill L. Davis

Bill L. Davis

Jesse S. Williamson

Date: May 20, 1999

PATENT
Our File: Will 2501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of:	BILL L. DAVIS and JESSE S. WILLIAMSON	(
For Reissue of U. S. Patent 5,630,363	Issued May 20, 1997 Serial No. 08/515/097	(Group Art Unit:_____
Filing Date:	May 20, 1999	(Examiner: _____
Serial No:	_____	(
For:	COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS	(

DECLARATION OF RAYMOND J. PRINCE

I, Raymond J. Prince, under penalties of perjury declare and state the following:

1. I am senior technical consultant in the Technical Services Group at the Graphic Arts Technical Foundation in Sewickley, Pennsylvania. I graduated from printing management from Rochester Institute of Technology receiving a Bachelors of Science degree and have received a Masters of Science degree from South Dakota State University. A copy of my *curriculum vitae* is attached hereto as " Exhibit "A." I am an expert in the printing arts.

2. I have been asked to review U. S. Patent 5,630,363 and give my opinion as to its teachings to one of ordinary skill in the printing arts, and to respond to specific questions concerning (1) the teaching of the sentence of col. 1, line 54-55 ("Many sheetfed presses can perfect (print both sides of the paper) in one pass through the press.") as that sentence impacts the scope of the invention taught to the printing artisan, and (2) the correct interpretation of the term "over" in the specification and claims.

3. Regarding U. S. Patent No. 5,630.363 and the use of the word "over, " I would like to offer the following thoughts: The word "over" when used in the Graphic Arts Industry has many meanings. In the patent it is used in two ways, namely (First) one ink printing over (on top of) another ink, coating, colorant or substrate, and (Second). ink, colorant, or coating being printed on both sides of the sheet or substrate. Specifically , as of August 14, 1995 - and the same is true today - the term "over" means to one of ordinary skill in the printing art reading the '363 patent either "on top of" (i.e., the same side of) the substrate, or paper, or by the reference in the paragraph at col. 2, lines 49-58 to the term "perfect" with respect to offset lithography, printing on the reverse side. The claims which refer to printing in a subsequent station "over" an image previously printed means unequivocally either "on top of" or "the reverse side of." To amplify the points I offer the following:

(1.) In the first meaning we commonly use the word over when describing overprinting or what a printer would call trapping of an ink. The term refers to the transfer of a coating, ink, or other colorant to the surface of another coating, ink, colorant or substrate. The coating ink, or colorant may be wet or dry. This term has been in common usage since at least 1920 in this regard and very possibly earlier.

(2.) In the second meaning the word over describes the printing of a coating, ink, or colorant on both sides of the paper or substrate during one pass on a printing press. This can be accomplished in many ways: (a) the use of a blanket to blanket web press, (b) the use of a double ending hardback web press, (c) the use of a perfecting unit placed anywhere on a sheetfed press, (d) the use of a back printer on a sheetfed press located on any unit of a sheetfed press. The term in this case has been in use since 1880 in this regard and possibly earlier.

4. The terms "perfect" or "perfecting" in the art teaches one skilled in the art several options of printing on both sides of the substrate. One option is to "tumble" the substrate in order to print on the reverse side. I enclose as Exhibit B several literature references concerning "perfect" or "perfecting."

5. As I read the '363 patent, it covers all of the various ways a printer would apply a coating, ink, or colorant to another coating, ink, colorant, or substrate to form an image.

6. I have been a field technical auditor for Williamson Printing Corporation about twenty (20) years, analyzing the technical processes Williamson uses to make its products and providing advice where I believe it is prudent to update their technology. I do this for about 25 clients, of which Williamson is one.

The undersigned declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application of any reissue patent issuing thereon.

Raymond J. Prince

Date: 5/19/04

PATENT
Our File: WILL 2501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of:	§	
BILL L. DAVIS and JESSE S. WILLIAMSON	§	
	§	
For Reissue of U. S. Patent 5,630,363	§	Group Art Unit: _____
Issued May 20, 1997	§	
Serial No. 08/515,097	§	
	§	
Filing Date: May 20, 1999	§	Examiner: _____
	§	
	§	
Serial No.: _____	§	
	§	
For: **COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS**	§	

JOINT DECLARATION SUBMITTED UNDER 37 C.F.R. §1.57 (b)

TO: The Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

SIR:

Petitioners (1) Bill L. Davis, of 1126 Tipton Road, Irving, Texas 75067; and (2) Jesse S. Williamson, of 5738 Caruth, Dallas, Texas 75209, declare that:

1. In approximately June 1994, Williamson Printing Corporation ("Williamson Printing"), Petitioner's employer, ordered several printing presses from Heidelberger Druckmaschinen of Heidelberg, Germany ("Heidelberg"). One of these presses, a seven-color press with a tower coater ("the seven-color press") was installed at Williamson Printing in approximately October 1994. Both before, during and after this time, Petitioners and Williamson Printing researched and observed flexographic printing/coating systems offered by several companies, including Printing Research, Inc. ("Printing Research"). In approximately October-November 1994, Printing Research demonstrated to Petitioners its end-of-press anilox coating

system, known as the plate/blanket coater. This system was demonstrated using flexographic plates, inks, coatings, and slurries.

2. Printing Research's end-of-press plate/blanket coater is shown in Figure 1 of Printing Research's brochure, which is attached as Exhibit 1, together with the correspondence from Printing Research with which it was sent. The plate/blanket coater shown in Figure 1 of the brochure will not work on presses with extended delivery such as the Heidelberg presses purchased by Williamson Printing.

3. In approximately December 1994, Petitioners requested Printing Research to design and install on the tower coater at the end of Williamson Printing's seven-color press an experimental flexographic printer coater having an anilox roller. This experimental printer coater was different from the plate/blanket coater shown in Figure 1 of Exhibit 1, and it was installed on the downstream side of the tower coater at the end of the seven-color press. In approximately January 1995, this experimental printer coater was tested at Williamson Printing using flexographic plates, inks, coatings, and slurries.

4. One of the other presses purchased by Williamson Printing from Heidelberger in approximately June 1994 was a triple tower press ("triple tower press"), which is also known as the LYL press. The triple tower press arrived at Williamson Printing in approximately February 1995 and was installed thereafter.

5. In approximately late January or early February 1995, Petitioners requested Printing Research to design and install on the first printing station of the triple tower press a flexographic printer coater like the experimental printer coater installed on the seven-color press. This unit was installed on the seven-color press in approximately mid-March 1995. Thus, at or about this time, Petitioners' invention was disclosed or imparted, at least in part, to Printing Research. To the best of our recollection, at no time did Petitioners or other technical personnel from Williamson Printing and technical personnel from Printing Research exchange technical memoranda as to the invention disclosed in the '363 patent or otherwise work together intimately in an integrated joint research project regarding Petitioners' '363 process. The only

correspondence we can find between Williamson Printing and Printing Research after Exhibit 1, and prior to installation of the interstation printer coater, is attached hereto as Exhibit 2.

6. The coater apparatus designed and installed on the first printing station of the triple tower press is the coater apparatus 43 shown in Figure 2 of the U. S. Patent No. 5,630,363 ("the '363 patent") and described in the specification at, for example, col. 6, lines 22-32. As explained in the specification of the '363 patent, coater apparatus 43 may be used to convert a conventional offset lithographic printing station to a station for performing the flexographic process to apply flexographic inks, coatings, and other liquid vehicles containing suspended particles such as metal particles or encapsulated essences. Figure 2 of the '363 patent does not show or describe the end-of-press plate/blanket coater of the brochure of Exhibit 1, but reflects a custom-made interstation printer coater designed at the request of Petitioners for Petitioners' method.

7. Subsequent to the filing date on August 14, 1995 of Petitioners' application leading to the '363 patent, Howard W. DeMoore and two other employees of Printing Research filed two applications on October 2, 1995, Serial Nos. 538,123 and 538,274, having common disclosure leading to U. S. Patents No. 5,615,316 (method) and No. 5,598,777 (apparatus). Neither the '316 or '777 patents disclose or claim Petitioners' claimed method or claimed apparatus, or the apparatus of Figure 2 of the '363 patent, or even the previously mentioned apparatus of Figure 1 of Exhibit 1.

8. On January 19, 1999, Petitioners and representatives of Printing Research, including Howard W. DeMoore and Steve Garner, attended a meeting with Petitioners at Williamson Printing's offices. At that time, Mr. DeMoore, for the first time, informed Petitioners that he had learned of the '363 patent. In the ensuing discussion about the '363 patent at that meeting, Petitioner Williamson informed Mr. DeMoore that Williamson Printing was willing to grant Printing Research a license under the '363 patent in exchange for payment of a royalty. At that meeting, no claim was made by any representatives of Printing Research that Mr.

DeMoore or any other employees of Printing Research were co-inventors of the invention of the '363 patent.

9. Following this meeting, another meeting was held at Williamson Printing on January 29, 1999, which was attended by Petitioners, other employees of Williamson Printing, and representatives of Printing Research. At this meeting, the basis for determining a royalty for a license under the '363 patent was discussed, and Mr. DeMoore said that Printing Research would pay a royalty for a license under the '363 patent.

8. The parties commenced writing each other after these January meetings starting in early February 1999. (See Exhibit 3). On or about March 31, 1999, a letter addressed to Mr. Jerry Williamson, the Chairman of the Board of Williamson Printing, was hand delivered to Williamson Printing by Steve Garner of Printing Research. A copy of this letter is attached as Exhibit 4. In that letter, Mr. DeMoore claimed for the first time that one or more employees of Printing Research should have been designated as co-inventors of the invention of the '363 patent.

9. On or about April 7, 1999, a letter was sent by Jerry Williamson to Mr. Howard DeMoore in response to the letter of March 31, 1999. A copy of the April 7, 1999, letter is attached hereto as Exhibit 5. In the fourth paragraph of that letter, Mr. Williamson stated the following:

> We are quite surprised by your latest position that somehow you and/or others at PRI should be named as inventors on the patent. It is unusual that you would now, for the first time, make such an allegation after so many prior discussions regarding PRI taking a license under the patent. Apparently, your allegation was made only after PRI was dissatisfied with WPC's proposed royalty rate to license the patent.

In the fifth paragraph of this letter, Mr. Williamson stated the following:

> In any event, based on the information provided to me and discussions with our patent attorney, we believe Bill and Jesse are the correct, and are the only inventors because they had a complete conception of the claimed invention before PRI was asked to design the equipment, to which you refer in your letter, for use with our process. If you have any additional information concerning this matter, please forward it to me as quickly as possible for our review and discussion.

10. On or about April 13, 1999, Jerry Williamson received another letter from Mr. DeMoore, a copy of which is attached as Exhibit 6. In response to Mr. DeMoore's letter of April 13, 1999, Jerry Williamson sent a letter dated April 23, 1999, to Mr. DeMoore. A copy of this letter is attached hereto as Exhibit 7.

11. On or about April 27, 1999, Mr. DeMoore again wrote Jerry Williamson in regard to inventorship of the '363 patent. A copy of this letter is attached hereto as Exhibit 8. In response to Mr. DeMoore's letter of April 27, 1999, Jerry Williamson, on or about May 5, 1999, sent another letter to Mr. DeMoore, a copy of which is attached as Exhibit 9. In the fourth paragraph of this letter, Mr. Williamson again requested Mr. DeMoore to provide for Williamson Printing's consideration "any documentation indicating that you, or anyone else at Printing Research, should be designated as an inventor of the printing apparatus described in claims 1-28 of our patent, or the process described in claims 29-41 of our patent . . . ." To the best of Petitioners' knowledge, no such documentation or additional information on this subject has been provided to Williamson Printing by Printing Research.

12. At no time has Printing Research asserted to Petitioners that the '316 or '777 patents disclose or claim a common invention with our '363 patent.

Petitioners hereby declare that all statements herein of their own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Bill L. Davis

(1) Bill L. Davis 5-20-99

5-20-99

(2) Jesse S. Williamson

PATENT
Our File: WILL 2501

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Reissue Application of: **BILL L. DAVIS and JESSE S. WILLIAMSON**	§	
For Reissue of U. S. Patent 5,630,363 Issued May 20, 1997 Serial No. 08/515,097	§	Group Art Unit: _____
Filing Date: May 20, 1999	§	Examiner: _____
Serial No.: _____	§	
For: **COMBINED LITHOGRAPHIC/ FLEXOGRAPHIC PRINTING APPARATUS AND PROCESS**	§	

DECLARATION AND POWER OF ATTORNEY

TO: The Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

SIR:

The undersigned Applicant for Reissue (which may hereinafter be referred to as "Williamson") is an Texas corporation having a mailing address of 6700 Denton Drive, Dallas, Texas 75235-4497, which owns the entire right, title and interest in U.S. Patent 5,630,363. Assignee came into possession of the entire right, title and interest in U.S. Patent 5,630,363 via an assignment from the inventors, Bill L. Davis and Jesse S. Williamson, on or about September 18, 1995, during the prosecution of the application leading to the '363 patent. Attached hereto is a true copy of the last assignment of record recorded in the PTO at Reel 7963, Frame 0457.

Reissue Applicant is making available in good faith in this reissue application all material information of which it and its agents are aware, and acknowledged the duty of candor and good faith towards the Patent and Trademark Office to disclose all material prior art patents and other printed publications as set forth in 37 C.F.R. 1.56(a) (1997).

Reissue Applicant hereby appoints the following attorneys to prosecute this reexamination and to transact all business in the Patent and Trademark Office connected therewith: ROBERT HARDY FALK, Registration No. 27,877, and all other attorneys within the firm of Falk & Fish, L.L.P.

Address all telephone calls to ROBERT HARDY FALK at telephone number (214) 954-4400 and address correspondence to:

ROBERT HARDY FALK
FALK & FISH, L.L.P.
700 North Pearl Street, Suite 970, LB 366
Dallas, Texas 75201

Reissue Applicant hereby declares that all statements herein of their own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

WILLIAMSON PRINTING CORPORATION,
a Texas Corporation

Jerry B. Williamson, Ch.

By: (1): Jerry B. Williamson
Its: Chairman of the Board

Jesse S. Williamson

By: (2): Jesse S. Williamson
Its: President

STATE OF TEXAS)
)
COUNTY OF DALLAS)

Before me on this 18th day of May, 1999, personally appeared (1) Jerry B. Williamson, to me personally known to be the Chairman of Williamson Printing Corporation, and (2) Jesse S. Williamson, to me personally known to be the President of Williamson Printing Corporation, and each of whom executed the above instrument, and acknowledged to me that he executed the same of his own free will and for the purposes therein set forth.

Lisa S. Wood
Notary Public

My Commission Expires: 12/27/99

LISA S. WOOD
Notary Public, State of Texas
My Commission Expires 12-27-99